Nature Magazine

VOLUME 45 NUMBER 6

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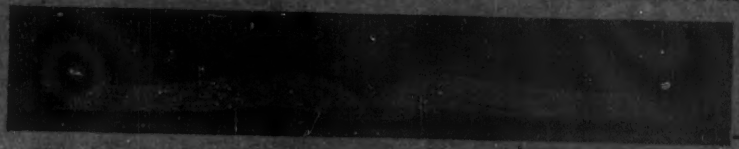

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Bulletins Received

"The Unvanquished Buffalo," by Henry H. Collins, Jr., Blue Heron Press, Box 236, Bronxville 8, New York. The story of the bison, then and now. Illustrated in color. 25 cents. . ."Apparatus of Joseph Priestly." Dickinson College, Carlisle, Pa. Description of the apparatus of the discoverer of oxygen as preserved in the collections of Dickinson College. . ."Botanical Books Prints and Drawings." A catalog of this material from the collection of Mrs. Arthur Roy Hunt. Carnegie Institute, Fine Arts Department, Forbes Street, Pittsburgh 13, Pa., $1.00. . ."Your Answer Book on Penta Wood Preservation." Information on pentachlorophenol, a chemical used to protect wood against decay and insect attack. Monsanto Chemical Co., St. Louis 4, Missouri. . ."Conservation in Camping." Report of a workshop on conservation. American Camping Association, 343 South Dearborn St., Chicago 4, Illinois. . ."The Outdoor Schoolroom for Outdoor Living," by William Gould Vinal. A 70-page booklet on outdoor education. One dollar from the author, R.F.D., Vinehall, Cohasset, Massachusetts. . ."The Golden Mantled Ground Squirrel," by Ralph R. Huestis. Crater Lake Natural History Association, Crater Lake National Park, Oregon. Fifteen cents. . . "Crocodile Hunting in Central America," by Karl P. Schmidt. Chicago Natural History Museum. Twenty-nine cents. . . "The Truth about Snake Stories," by Karl P. Schmidt. Chicago Natural History Museum. Twenty-four cents. . . "The Story of Delta Waterfowl Research Station." North American Wildlife Foundation 709 Wire Building, Washington 5, D.C. . ."Nova Scotia Tour Book." An official guide to the highways of Nova Scotia. Free from Nova Scotia Bureau of Information, Provincial Building, Halifax, Nova Scotia. . ."What You Should Know about Oak Wilt." National Oak Wilt Research Committee, P.O. Box 373, Memphis 3, Tennessee. . ."A Discussion of the Forest Products and Lumber Industries," by Harry T. Kendall. Free from National Lumber Manufacturers Association, Washington 6, D.C. . ."North America's Tropical Forest," by Paul Griswold Howes. Report on Royal Palm State Park in southern Florida. The Bruce Museum, Bruce Park, Greenwich, Connecticut. . . "A Program of Conservation in Action." Massachusetts Audubon Society, Audubon House, 155 Newbury Street, Boston 16, Massachusetts. . ."Zaculeu." Report on the restoration of this ancient city. A Middle America cultural project of the United Fruit Company, Boston, Massachusetts. . ."Conservation in the Americas, No. 11," edited by Annette L. Flugger. Pan American Union, Washington, D.C. . ."Soil and Water Conservation and Use in Oregon." Extension Bulletin 725, Oregon State College, Corvallis, Oregon . . ."Western Gulf Drainage Basin," "Western Great Lakes Drainage Basin," "Ohio River Drainage Basin," "Southeast Drainage Basins," "Upper Mississippi Drainage Basin." Five more reports in the series of cooperative State-Federal studies of water pollution conditions on a drainage basin basis. Public Health Service, Federal Security Agency, Washington, D.C. . ."The Welch Biology and General Science Digest," W. M. Welch Scientific Company, 1515 Sedgwick Sreet, Chicago 10, Illinois. . ."The Story of West Coast Lumber," West Coast Lumberman's Association, 1410 S.W. Morrison St., Portland 5, Oregon.

Briefly Noted

Sportoons. By Tom Rost. Harrisburg, Pa. 1952. The Stackpole Company. $1.00.

An amusing collection of original cartoons about hunting and fishing, and hunters and fishermen.

Swamp Chief. By Zachary Ball. New York. 1952. Holiday House. 212 pages. $2.50.

This is a fiction story of Joe Panther, a young Seminole, against a background of deep sea fishing and the Everglades.

Bertrand Russell's Dictionary of Mind, Matter and Morals. Edited by Lester E. Denonn. New York. 1952. Philosophical Library. 290 pages. $5.00.

One thousand or so definitions and opinions distilled from the writings of Lord Russell.

Jareb. By Miriam Powell. New York. 1952. Thomas Y. Crowell Company, 241 pages. Illustrated by Marc Simont. $2.50.

A story of a boy and his hound dog against a background of a poor, proud people and the pine forests in which they dwell.

Black Bass

Black Bass Fishing. By Robert Page Lincoln. Harrisburg, Pa. 1952. The Stackpole Company. 376 pages. Illustrated by Steve Miller. $5.00.

Here is theory and practice about fishing for black bass by an author who knows whereof he writes probably better than any other fisherman. Bob Lincoln grew up with the development of bass tackle and techniques, and has wet his line in bass waters far and wide. Besides the practical information for bass fishermen, this book provides entertaining reading for all anglers.

Pre-History

Prelude to History. By Adrian Coates. New York. 1952. The Philosophical Library. 289 pages. $4.75.

This book provides the general reader with a critical summary of the present state of prehistoric studies, and discusses the origins of art and religion, the development of the incest taboo, and theories of the psycho-analytic school, and in more general terms the relation of ourselves to our human past.

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Nature in Print

By HOWARD ZAHNISER

"IF I have confirmed my conviction that, for me at least, nature, wet or dry, furnishes the most cheerful as well as the most intelligible context for thinking and living and being, that is all I had hoped for," writes Joseph Wood Krutch in the concluding "Postscript" to his reflections on fifteen months in the Southwest entitled *The Desert Year*.

The "world" of Nature, he believes, has become increasingly too little with us. If he himself should join those who are forsaking cities to escape atom bombs it would be rather because he would want "to preserve some sanity of mind and spirit" until the bombs fall.

It is not necessary, he holds, in thus regarding so highly the values of Nature as context to believe that Nature "embodies any ideal rightness." One would come to the same conclusion, he writes, even "if one believes, instead, that she illustrates the fundamental contingencies of things-as-they-are and that those who forget to observe her are pretty sure to act with disastrous disregard of the contingencies which she illustrates."

"Since nature is joyous," he advises, "it is a great mistake to forget how to share in her joy. Since she also accepts much that is unacceptable to men who have pushed too far in their efforts to imagine a universe they think they would like better, it is also a great mistake to forget completely how to reconcile ourselves, as she does, to things unreconcilable with purely human attitudes."

These are understandings, Mr. Krutch realizes, that are unattained or forgotten by men who spend all their lives in a man-made environment — understandings that are revealed or revived with a resort to the surroundings we call natural.

Thus, a desert adventure into such surroundings confirmed for Mr. Krutch convictions which he had already, on the basis of experience in the natural surroundings of the "beautiful world of New England" and elsewhere. In fact, quoting Robert Frost (I believe), Mr. Krutch concludes:

"What I learned from my desert year was, first and most generally, to be 'more sure of all I thought was true.' Specifically, I re-learned many platitudes, including some I have mentioned — such as, for instance, that courage is admirable even in a cactus; that an abundance of some good things is perfectly compatible with a scarcity of others; that life is everywhere precarious, man everywhere small. And of course I learned also one platitude more: Wherever one goes one has one's self for company."

It seems most significant that Mr. Krutch's benefits from this long year in the Southwest are thus "first and most generally" the benefits not distinctively of living in the desert, but of living in close association with wildness — not the benefits of being hundreds of miles away from his New York City home, but of being far enough away from it to be consciously part of the world of Nature rather than of man — and to have the opportunity of being alone in a spacious outdoors. "Large sections of space," he comments in one discussion, "are not among the things which ought to be owned; and where there are so many people that, if each is to possess jealously the little he needs, then there is nothing left over for general ownership, the situation is disastrous, physically as well as spiritually." It is significant that from the desert Mr. Krutch returns with wisdom and counsel that pertain not to the desert alone but to all of us generally.

"Respectable universities, before they confer the degree which certifies that the recipient is now wise in philosophy, in science, or in sociology, commonly require a minimum period of 'residence'," Mr. Krutch recalls, but he suggests: "They might well require also a supplementary period of 'nonresidence', to be passed neither at the university nor in any other populous place but alone." Not to have known such an experience, he perceives, is "not to have known one's self," and this in turn is "to have known no one" and in this ignorance to misunderstand all our human problems, "to suppose, as sociology commonly does, that the central problems are the problems of technology and politics," and to forget that "the question of the Good Life. . . . has to do first of all, not with human institutions but with the human being himself."

It is not an escape from our urban mechanized living that Mr. Krutch's experience indicates but rather an *excursion* from it for the sake of understanding it better and helping to keep its essential integration with all of life, for its own betterment and continuance. It is a round-trip excursion. Only by stepping back for a time into the wilderness can we understand and direct our civilization. Only from the top of a mountain or from the remoteness of a region that man has not modified can we see ourselves. Or, as Mr. Krutch so clearly says on his return from a mountain top in the desert:

"Only from such distance can man be seen either in perspective or in his real context, and it is the absence of that context which invalidates all the solutions to human problems formulated — as today all such solutions are — in no context except that of man's own making. Without this perspective and this context, philosophy and religion degenerate into sociology; and sociology is merely a modern substitute for wisdom. What it lacks is not merely the context of nature, indispensable as that is. It lacks also the context of human nature itself, for which it tries foolishly to substitute some mere observations of human behavior."

The Desert Year is thus a book of deep value to us in our thoughful considerations of life. It is indeed also an interesting report from the desert — the desert that "is courageous and happy, not easy or luxurious," that to Mr. Krutch "suggests patience and struggle and endurance." Some idea of the book's account of the desert and Mr. Krutch's experiences with it can be obtained from its interesting chapter titles: Why I Came, What It Looks Like, How To See It, How Some Others Live There, Desert Rain, What the Desert Is Good For, The Contemplative Toad, From a Mountaintop, The Individual and the Species, In Search of an Autumn, Tour of Inspection, The Metaphor of the Grasslands, Spring, A Bird in the Bush, Undiscovered Country, and Postscript.

"During more than eight months," Mr. Krutch says, "I stuck close to my own little stretch of cactus and sand," in the region of Tucson, Arizona, in what he speaks of as "my own Lower Sonoran," in contrast to the Mojave and Colorado deserts to the west. Then he made his "tour of inspection," and his reader has the sense of having shared an experience with "the variety which can be achieved within the limitations imposed by the one invariable condition — scarcity of water." It is a great experience.

On his return to his "own Lower Sonoran" Mr. Krutch's

A Perennial Joy

By PAULINE DILLINGHAM

The peach tree in my garden long stood bare
Of leaf or fruit in winter's frosty air;
But sharply etched against a pale blue sky
It still had beauty for the seeing eye.

Now, tiny wine-red buds to each branch cling
From which the rosy petals soon will spring
Of flowers, exquisite in shape and hue,
Ethereal cups, to catch the sun and dew.

When every fragile blossom is full blown,
Pure loveliness can call the tree its own:
When spring's enchanting harmonies are mute,
The summer's heat will ripen luscious fruit.

reflections led him to what appear to be his most distinctive conclusions related to the desert as such. "More than ever convinced not only that all these southwestern deserts are exhilarating, but also that, considered not botanically, or geographically, or zoologically, but spiritually, they are more alike than different," he thought also that he understood better than before "what it is that they do to the soul." He thought he understood better why the desert country's "spaciousness as well as its austerity are more than merely physically — and nervously — reassuring to those who have found the great centers too crowded and too tense." And he expressed this understanding in a deeply significant comment on a sense of values — a comment that one might wish to read again and again to himself and to those with whom he shares his civilized living. To Mr. Krutch "all the deserts seem to suggest and confirm a system of values for which much ought to be, but seldom is, said." And then he goes on to say this much:

"In contemporary society, the all but universal ambition of the individual, and the all but invariable aim of every proposed social or political movement, is to get for oneself or for others, more *things*. Even those who insist that if the aim is happiness or contentment the desire for material wealth is a fallacy, are nevertheless sure that to be richer in material things is what society as a whole needs to make mankind happier and more contented. The Liberal, so-called, and the Reactionary, so-called, accuse one another of unreason and of selfishness. But the dispute is only over who shall get what proportion of the More, never over the question whether or not more of the kind of thing being disputed over is what is really needed."

"In the desert, on the other hand," Mr. Krutch perceived, "the very fauna and flora proclaim that one can have a great deal of certain things while having very little of others; that one kind of scarcity is compatible with, perhaps even a necessary condition of, another kind of plenty — for instance, on even the level of things tangible or visible, that plenty of light and plenty of space may go with a scarcity of water."

"I am no ascetic," Mr. Krutch protests, "and, so at least I believe, no fanatic of any other sort. I am not praising want," he emphasizes, "and I have no romantic notion that distresses should not be relieved. But," he continues, "I do, in all seriousness, question the assumption that endless progress implies the endless multiplication of goods and gadgets, even that 'real wages' and 'production per man hour' are necessarily an approximate index of welfare. I am not saying that a reduction in the standard of material living automatically brings with it an increase in happiness or nobility, but I do doubt that the converse is true, and I do find it astonishing that this doubt seems so seldom

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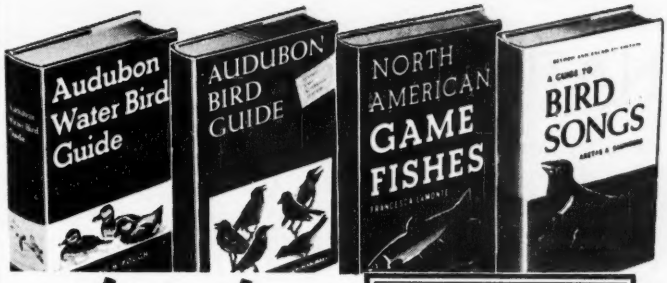

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Forest Gifts

Gifts from the Forest. By Gertrude Wallace Wall. New York. 1952. Charles Scribner's Sons. 96 pages. Illustrated with photographs by John Calvin Towsley. $2.50.

Here is a pictorial story of lumbering in the big timber of lumber, from the uncut forest to the finished product. The author's succinct text emphasizes the great wealth that our forest resources have contributed to America and the philosophy of today, which seeks to maintain that resource on a perpetual yield basis.

Gardening Handbook

Gardening Handbook. By T. H. Everett. New York. New York. 1952. Sterling Publishing Company. 144 pages. Illustrated. $2.50.

This is a concise, information-packed, practical guide to home gardening. It is profusely illustrated with carefully selected pictures that underline the advice given in the text. The author is horticulturist at the New York Botanical Garden and has a background of professional gardening that dates back for more than thirty-five years.

Science Education

Secondary Science Education. By Harrington Wells. New York. 1952. McGraw-Hill Book Company. 367 pages. $4.50.

This is a companion book to the author's *Elementary Science Education.* It completes the survey of science education as a specialized field below the college level. Dr. Wells is Associate Professor of Science Education, University of California, Santa Barbara College, and he points out that his "book represents an over-all 'job analysis' in terms of philosophy of approach, methods of procedure and suggested subject content."

Early Europe

Prehistoric Europe. By J. G. D. Clark. New York. 1952. The Philosophical Library. 349 pages. Illustrated. $12.00.

This book is concerned with the ways in which early man, in competition with other forms of life, maintained himself on European soil since the end of the Pleistocene Ice Age, and with how he managed not merely to survive but to raise his standards from those of savages to those of peasants ready to support the full weight of urban civilization.

To the Brook

Let's Go to the Brook. Harriet E. Huntington. New York. 1952. Doubleday and Company. 89 pages. Illustrated with photographs by the author. $2.75.

This is largely a picture book, with each picture accompanied by simple descriptive text aimed at an audience designated as "up to 9." This is the fourth in a series of simple Nature books introducing the younger folk to different locales in Nature.

Black Hills

The Black Hills. By Albert N. Williams. Dallas, Texas. 1952. Southern Methodist University Press. 130 pages. Illustrated. $2.50.

One of the most fascinating regions in the United States is to be found in the Black Hills of South Dakota. It is an area rich in history, both in terms of geology and man. Today it is a great, mid-continent resort area. This little book is the fourth in an "American Resort Series" and a worthy addition to that series. The story of this region is entertainingly and informatively told, making the book as valuable for reading as it is useful as a guide to the Black Hills and the Badlands.

Caring for Animals

Home-Made Zoo. By Sylvia S. Greenberg and Edith L. Raskin. New York. 1952. David McKay Company. 256 pages. $3.00.

This is a practical guide to the care of small pets, and is the result of the experience of two teachers in caring for such pets in schoolrooms and in the home. It should be of great value to teachers, parents, youth leaders and young pet owners. Following the advice in this book will make life much more endurable for small captives.

Sargent Memorial

Educational Directions. Boston. 1952. F. Porter Sargent. 128 pages. $2.00.

This little book is reprinted from the thirty-third edition of *The Handbook of Private Schools* and is a memorial to the late Porter E. Sargent, scientist, teacher, writer and specialist in private schools and summer camps. It includes a word portrait of Porter Sargent, tributes to him, and other information on the Sargent activities.

Biotic World and Man

The Biotic World and Man. By Lorus J. and Margery J. Milne. New York. 1952. Prentice-Hall. 588 pages. Illustrated. $6.75.

"In this new book on living things," say the Milnes in a foreword, "the authors are expressing their own enthusiasm for the board and integrated approach. They are convinced that a factual understanding of biological science improves chances for a successful, happy and useful life. . . We have striven to include chiefly the background needed for intelligent evaluation of reports on scientific progress in modern magazines and newspapers."

Botany

Botany. By Carl L. Wilson. New York. 1952. The Dryden Press. 483 pages. Illustrated. $6.10.

This textbook is primarily for the year course in introductory college botany, but, with certain omissions, may be adapted for a one-semester or two-quarter course. The author is Professor of Botany at Dartmouth College.

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NATURE IN PRINT

(Continued from page 283)

shared.

"If what I find in the desert is no example to be imitated, it suggests a metaphor which to me is meaningful. What I learn by way of this metaphor is not the kind of thing I learn from a treatise on economics or even on morals. But it is very much the kind of thing I learn from an essay by Emerson or a poem by Emily Dickinson. And a world which seems to have passed long ago the point where treatises on economics or on morals begin to pay a sadly diminished return in wisdom, might do well to pay more attention to what poets — and deserts — have striven to communicate in their own way."

"When I go back, as I must," wrote Mr. Krutch in the final paragraph of this essay, "to live in a world almost wholly man-made and almost wholly absorbed in problems which man himself has created, I shall often return in memory to things seen and done during my desert interlude. There will be, first of all, encounters with birds and beasts to be remembered. Then, as on a screen, I shall see my mental kodachromes projected — sometimes of vast vistas of mountain or plain, sometimes little close-ups of an improbable blossom bursting out of a cactus, or of a lizard poised for a moment in the sun. All too often, I am afraid, I shall be reminded how whole acres of New York City in which nothing grows have been turned into a desert far more absolute than any I have ever seen in the Southwest, and I shall wonder whether man himself can live well in a place where nothing else can live at all. But I doubt whether anything else will be so continuously in the back of my mind as the consciousness of that metaphor which two thousand miles of countryside set forth, and I shall not forget its lesson: much can be lacking in the midst of plenty; on the other hand, where some things are scarce, others, no less desirable, may abound."

As Mr. Krutch thus in his recollections, so we in our reading, can well return often to *The Desert Year*, and this his final paragraph in his essay on the meaningful metaphor of the desert, well summarizes what we shall be seeking in this interesting and significant book conceived in the context of nature. And perhaps through its suggestions and example we shall also be helped to prove to ourselves in our own excursions that "nature, wet or dry," does indeed furnish "The most cheerful as well as the most intelligible context for thinking, living, and being."

The Desert Year. By Joseph Wood Krutch. New York: William Sloane Associates. 1952. 270 pages (5⅝ by 8⅜ in.), with 12 drawings by Rudolph Freund (used as 32 decorations.). $3.75.

Heredity

Understanding Heredity. By Richard B. Goldschmidt. New York. 1952. John Wiley and Sons. 228 pages. $3.75.

This is a primer of genetics, an introduction to this subject written by one of the world's leading geneticists. It is a volume that is understandable, and can be enjoyed by those without a scientific background, but who are interested in the riddle of heredity.

Physics

The Rise of the New Physics. By A. D'Abro. New York. 1952. Dover Publications. In two volumes. Illustrated. $8.00 the set.

This two-volume discussion of the mathematical and physical theories of physics is a corrected and enlarged edition of the earlier work entitled *Decline of Mechanism.*

Zoological Stamps

Zoology in Postage Stamps. By W. Dennis Way and O. D. Standen. New York. 1952. Philosophical Library. 113 pages. Illustrated. $5.00.

Many stamp collectors specialize. Some concentrate on certain countries; some specialize in stamps with a Nature design, of which there are an increasing number of issues. In this book philately and natural history are combined. Stamps with pictures of mammals, birds, reptiles, amphibians, fishes, arthropods and mollusks are considered in this interesting book. The text discusses both the animal, and its place in the animal world, and the stamp upon which its likeness appears. Many of the stamps are pictured.

Zoology Textbook

Zoology. By Alfred M. Elliott. New York. 1952. Appleton-Century-Crofts, Inc. 719 pages. Illustrated. $6.00.

For more than twenty years the author taught introductory zoology at the college and university level. During that period, he says, "it has become increasingly evident to me that in order to understand the life sciences, students need, more than anything else, a broad underlying principle to cling to. . .Thus organic evolution is the central theme of this work." There are seven parts to the book — Zoology as A Science, Life: Its Beginnings and Nature, The Organized Animal, The Rise of Animal Life, Organ Systems of Man, Continuity of Life and Organic Evolution. These parts are successfully integrated.

Modern Gardening

Modern Gardening. By P. P. Pirone. New York. 1952. Simon and Schuster. 371 pages. $3.50.

This book is described by the publishers as "a complete guide to the agricultural uses of modern chemistry's miracle drugs." It includes such modern gardening activities as feeding plants through their leaves, slowing down growth of shrubs and trees, spraying weeds to death, speeding up growth of vegetables and flowers, beating the insects. The author is plant pathologist at the New York Botanical Garden, where he has the responsibility for the health of some 12,000 different kinds of plants, both those growing indoors and outdoors. He is asked many gardening questions, and a special section of the book concerns the more important of some 500 questions that are often asked him, and their answers. This is a volume that truly takes in new territory in the garden, and with authority.

Name Your Pet

1001 Names for Pets. By Philip M. Rhodes. Tujunga, California. 1952. Cameo Publications. 48 pages. $1.00.

We know, of course, that much thought is devoted to the naming of children, but we had not realized that finding a name for a pet was too difficult. Perhaps it is, however, and this little book certainly should help solve any problems along that line.

Northern Wildlife

Wild Life beyond the North. By Frank Illingworth. New York. 1952. Charles Scribner's Sons. 168 pages. Illustrated. $3.75.

The author of this book has traveled widely "beyond the north" and has devoted special study to the plant and animal life that is found in a region that most people think of as a land of desolation. This interesting account of the Arctic animal's life will change that conception and also provide fascinating reading.

Naturalists

Famous Naturalists. By Lorus J. and Margery J. Milne. New York. 1952. Dodd, Mead and Company. 178 pages. Illustrated. $2.50.

This collection of biographies of fourteen famous naturalists is directed to an audience that the publishers describe as "boys and girls from 10 to 14." The naturalists included are Antony van Leeuwenhoek, Carl Linnaeus, Gilbert White, John James Audubon, Louis Agassiz, Charles Darwin, Alfred Russel Wallace, Henry David Thoreau, J. Henri Fabre, John Burroughs, John Muir, Frank M. Chapman, David Fairchild and Thomas Barbour. To compress the notable contributions of such a distinguished group into a book of this size was no mean task, and the Milnes have managed to do so most effectively and informatively.

Garden Soils

Our Garden Soils. By Charles E. Kellogg. New York. 1952. Macmillan. 232 pages. $4.00.

The author of this authoritative volume is Chief of the Division of Soil Survey of the United States Department of Agriculture. Soil science is a complex one, yet it is important to the home gardener, even one who must be content to garden in a window box. Dr. Kellogg has made the complexities of this subject applicable to the smallest need or to the greatest.

Contents Noted

NOW a Major in the U.S. Air Force, our one-time assistant editor, Burke Edwards, is ever alert to an appropriate item. He sends us a feature article from *Pacific Stars and Stripes*. The feature is by Andrew Headland, Jr., and is entitled "Seoul, the City that Wouldn't Quit." It is an interesting story of the manner in which the battered and battled-over Korean capital has persisted; how the rubble has been removed, utilities re-established and the economics of the city restored. But the special item in the story that caught the eye of our erstwhile assistant reports that "students of five middle schools are now undertaking a spring offensive of their own. The boys and girls are planting 45,000 trees in a reforestation program around Seoul, the city that wouldn't quit."

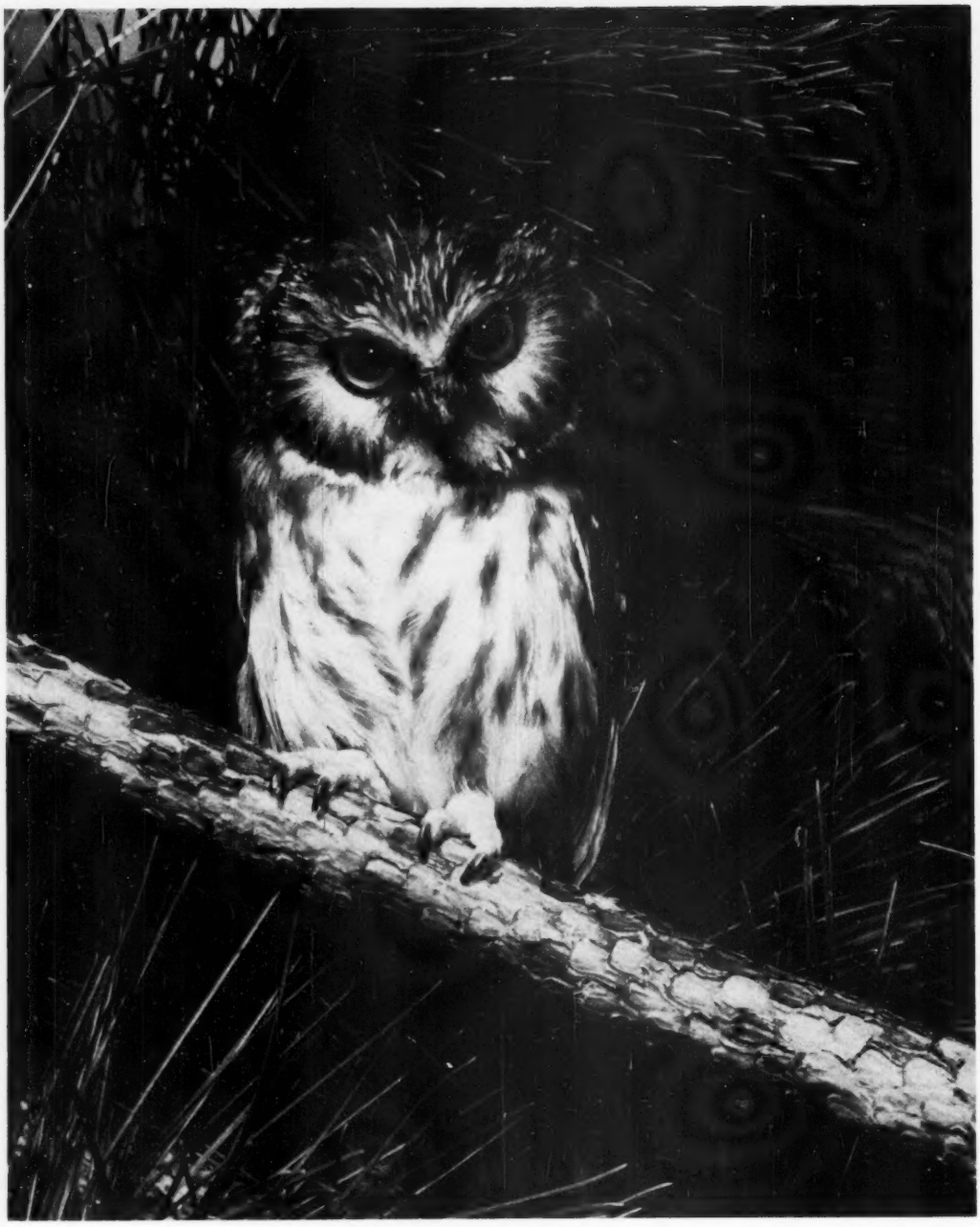
SEPARATING the fact from the fiction in the widely publicized "rabies scare" that has given the Philadelphia press a field day is difficult. Evidently there is proved incidence of rabies in foxes in the area. How widespread the infection is no one seems to have any certain idea, but there is no question about the hysteria created. An outstanding example of the latter is a headline in the *Chicago Tribune*. It reads: "Furious Fox Hordes Spread Death in East." This is over an Associated Press story that scarcely warrants such a heading, for the story says: "A plague of mad foxes, described as probably the worst in Pennsylvania's history, has aroused uneasiness in scores of towns and rural regions of the state." There is quite a difference between "uneasiness" and a picture of furious foxes spreading death. The scare seems to have died down once the local press got tired of the story, but the overplayed publicity has left its residue of ignorant prejudice.

WE HOPE that it does not mean an epidemic of such legislative proposals, but another bill has been introduced in Congress directing the Secretary of the Interior to open up a part of a wildlife refuge to public hunting. We have already commented on the Sikes Bill, H.R. 5953, which seeks to open up Saint Marks Wildlife Refuge in Florida. Now comes H.R. 7024, introduced by Representative T. Millet Hand of New Jersey to open up the Brigantine National Wildlife Refuge in New Jersey. This bill is almost identical in wording to the proposal of Mr. Sikes. Administration of our important system of wildlife refuges should be left to the U.S. Fish and Wildlife Service, and not to mandatory action by Congress. Not only have national conservation organizations opposed this sort of approach, but sportsmen's groups, knowing full well the importance of the refuges in maintaining the supply of migratory waterfowl, are registered in opposition. These bills are in the hands of the House Committee on Merchant Marine and Fisheries.

CONGRESSMAN William E. Hess of Ohio comes forward with a sound idea by introducing in the House a resolution that would designate the seven-day period beginning October 20, 1952, as "Cleaner Air Week." The resolution authorizes the President to issue a proclamation calling for public cooperation in cleaning up air pollution. Stream pollution, by its very obnoxious degree and widespread extent, is by now quite generally recognized as a menace. We are moving, slowly in many cases, to improve this situation. But not as widely realized is the extent of air pollution. It is a subject with which the U.S. Public Health Service is wrestling, with limited funds and personnel, and only where outstanding cases of pollutants in the air become evident. But there is a great potential menace in this form of pollution and it would be a constructive step to direct public attention to the fact.

LOCATED in the Lewis and Clark National Forest in Montana, the Bob Marshall Wilderness Area stands in the front rank among the nation's unspoiled wildernesses. It is named for the late Bob Marshall, pioneer crusader for the establishment of wilderness, one of the organizers of The Wilderness Society, forester and mountaineer. Thus the area stands as a sort of symbol among conservationists, and is outstanding both for its magnificent scenery and its numbers of resident wildlife. However, the Bureau of Reclamation saw the possibility of a reservoir site there, and put on its list of projects the Sun Butte Reservoir, starting studies to bring this about. However, Secretary of the Interior Oscar L. Chapman has now stepped into the picture and ordered cessation of this investigatory work. His order will be hailed by all conservationists, we are sure.

"SMOKEY Bear" has won his way into the hearts of a great body of Americans, and, in the process, has driven home the message of the need for protecting our forests against fire. Indeed, this ursine hero of the outdoors has achieved such popularity that here and there attempts have been made to appropriate him for other duties besides forest education. Commercial interests have seen an opportunity to capitalize on Smokey's appeal. This has inspired legislation in H.R. 5790, already favorably reported by the House Committee on the Judiciary, that would prohibit the unauthorized use of Smokey, or manufacture in any form of the character himself. The bear is the property of the U.S. Forest Service and came into being to serve in animated cartoons and other forms of public information looking to forest fire prevention. That is his important job, and it is so important that Smokey should be allowed to stick to it. R.W.W.



The author had captured "Junior" in order to study his behavior and his food habits, but there were times when the owl seemed seriously to be studying his captor.

In addition to a song, the saw-whet owl gave an odd, gutteral, scolding note when anyone stared at him.

Saga of A Saw-Whet

By RICHARD B. FISCHER

Photographs by the Author

LONG after the woodchucks have retired for their deep winter sleep, and when only a few of last summer's leaves still cling tenaciously to the oaks and beeches, a charming little owl — the saw-whet — appears in southern New York. We look for it from Thanksgiving until March wherever there are honeysuckle thickets or pine groves.

It was on one of those crisp, invigorating December days that we first saw "Junior," as he came to be called, in a pine grove on a long finger of land between the Hudson River and the mouth of the Croton River. Across the Croton lay Sing Sing. From where the bird perched the prison walls were plainly visible.

We wished to capture the owl for a study of behavior and food habits, but he took wing before our plan of attack was completed. With little difficulty we relocated him, then, confident the owl would stay put, we decided to return to the automobile, have lunch, and go back armed with an insect net.

Junior did not perform as expected. Instead, he returned to the original roosting place. After several unsuccessful attempts, he was finally netted and a cardboard carton served as a cage for the remainder of the day.

En route home we stopped at a restaurant in the upper Bronx to show our prize to some friends who were tabulating an Audubon bird count. When I raised the trunk lid of the car, I was startled to have the saw-whet fly into my face. I brushed him back, but he bounded right out again and nearly regained his freedom. At home a larger carton was fitted with a perch and a lid of wire screening.

Junior stayed in my bedroom (we turned the heat off) and soon became rather well adapted to his strange new life. During *his* night the bird was quiet and inactive, save for an occasional snack on a mouse or shrew. On *our* night, however, Junior was busy. Sometimes he would attempt to get out of the box, in the effort catching his talons in the fine screening and breaking off their needle-like tips. The blunted nails were almost normal again by May.

Although familiar with the songs and calls of most eastern birds, I had always wanted to hear a saw-whet owl, so one night I decided to lie awake as long as possible in the hope of hearing something. I did. At 1:45 a.m., Junior began a series of soft, low notes almost totally lacking in tonality; the only sound I have heard that bore any resemblance to them was the "tut - tut - tut" of a robin whose nest is disturbed.

In the beginning the owl seemed to be tuning up, as each song consisted of only four to six notes. Then he began singing much more rhythmically, but stopped instantly when I swallowed audibly on his fifteenth note. In a few moments Junior started again, uttering 72 successive notes. Between series of 91 and 104 consecutive notes were songs of shorter length, usually consisting of 15 to 20 notes.

The opening notes of a song were delivered about two-thirds of a second apart; by about the fifteenth they had begun to increase in volume, tonality, and frequency, as though the source were coming closer. At approximately the seventieth note, which a person could easily imitate by whistling, the sounds were about one-third of a second apart and quite loud. An odd overtone at

the end of each note then became apparent. It was a sort of husky pop, suggestive of the cough made by the brown jay one hears in Mexico. The notes at the end of a song possessed a mellow, vibrating quality unlike anything I have heard from any other bird.

I was relieved when the notes grew no louder after the ninetieth one, since everyone in the family would have been awakened. On a still night in the woods that song would carry hundreds of feet, perhaps to the ears of larger owls known to eat the saw-whet.

During all the time we studied Junior no one ever heard him give the saw-filing song — whence the name saw-whet is said to be derived — yet that is not surprising in view of the species' wide repertoire.

Occasionally "Junior" swallowed a wing tip or the tail of an English sparrow that he had eaten. Here are seen parts of a wing and tail protruding from the owl's pellets. The two smaller ones are typical for the species.

When Christmas recess ended, Junior and his cage were packed for the 270-mile drive to Cornell University. He behaved like a martyr. The Laboratory of Ornithology at Cornell has a large aviary on the roof of Fernow Hall, so one of the cages, arranged with a generous amount of evergreen prunings, became "home" for Junior. Apparently it suited him because he made only occasional attempts to escape. For neighbors there were a red-shouldered hawk and a crow, both recovering from gunshot wounds.

The great, vexing problem with captive birds, especially the predatory ones, is providing food, and the burden is thrust upon one the moment a bird is acquired. Whereas most small birds will accept a variety of items, an owl must have flesh — not mere ground beef, but meat with fur or feathers on it. Probably only after a person has attempted to sustain a raptor does he gain a real appreciation for its mouse-catching abilities.

I set out a line of small mammal traps almost the moment we arrived at the Cornell campus, although maintaining them required much time and limitless patience. If rain did not spring all the traps, they were snowed under, or upset by inquisitive red squirrels.

Early in February, when the "cupboard" was almost bare and thirty-five traps lay buried under a foot of snow, someone had what seemed a truly inspired idea. "Let's visit the haymow in the dairy barn some night and catch the starlings that roost there," he suggested. I borrowed several insect nets from Professor Uhler of the biology department and we sallied forth. Thirty-six birds were captured. A veritable landfall, I thought, enough to feed Junior for a month.

But Junior did not relish starling. Thinking that possibly he did not recognize so large a creature as a food item, we tried giving him half a bird. He did eat some then, but only a small quantity, and it was clear that starling was distasteful. The food supply problem was back with us again.

When I was reduced to setting trap lines in the university buildings and asking fellow students, and even professors, to catch mice in their pantries, Dr. Uhler offered a permanent solution. How about, he suggested, the white mice discarded by the College of Veterinary Medicine. Overnight I found myself with an inexhaustible food supply.

Fortunately, Junior was not a fussy eater. Dead mice, shrews, and birds were accepted right from the start of our association. Surplus food was stored in the freezing compartment of a refrigerator and thawed as needed.

The owl had characteristic ways of eating. He would not dine while anyone watched, but by surprising him during a meal, or by finding partially eaten food, I was able to piece together his table manners. Whether bird or mammal, the head was always eaten first. Sparrows' heads were almost never entirely consumed; rather, the pharyngeal region and rear part of the skull would be picked reasonably clean, and usually part of the brain was taken.

Then he ate his way posteriorly, as a rule plucking the wing feathers but seldom those of the body. Flesh was stripped from the wings as far as the "hand"; sometimes the whole wing tip and its attached feathers were swallowed, giving the resulting pellets an odd appearance. Surprising was the frequency with which Junior ignored the "drumsticks."

There was much less waste with a mammal, for the owl ate every part of it, only occasionally leaving a tail or fragment of skin and fur. However, he would have no part of a body that lacked its skin and skull. At times we trapped mammals that we desired to save as museum specimens; their skinned bodies were offered to Junior and, although they remained in the cage for a day or two, no other food being given him, the owl would not touch them.

One afternoon some students returned with several meadow mice they had captured under old haycocks. With a few English sparrows, I decided to test the owl's preference between birds and mammals by giving him a

choice on seven consecutive nights. On the first evening Junior ate the entire bird but only part of the mouse; we who had always defended this fine little owl as an outstanding rodent killer looked at each other. Our reservations were removed the following night when he selected the mammal and ate only part of the sparrow's head. On the next five evenings Junior continued to eat the mice and scarcely touched the birds.

From the time Junior was captured and until Easter I kept a detailed record of every item of food he received, the time it was given, and when it was eaten. Each pellet (owls regurgitate undigested materials in the form of pellets) was wrapped in paper bearing the date and time of recovery. When the boxes of pellets and thirty-odd pages of notes are analyzed, an accurate idea of the bird's food requirements and digestive rate may emerge.

The Albert R. Brand Bird Song Foundation at Cornell, famous for its collection of natural history sounds, had not recorded a saw-whet owl. Often, while studying late at night in the graduate laboratory, we would hear Junior's soft, mellow song, surely one of the finest sounds in Nature. So, hanging a microphone in the cage and running the wire to the recording apparatus downstairs, Professor Kellogg gave the owl several weeks to become accustomed to the strange object.

On the chosen date Dr. Kellogg came prepared to spend the entire night in the recording room, and when we left for home he was curled up in an easy chair with a thick book. The recording amplifier was turned up so high that every sound Junior made was certain to keep the professor awake. Indeed, the cracking of bones as the owl ate "breakfast" sounded like someone breaking kindling wood over a knee!

Junior quieted down after 3:30 a. m., and the ornithologist fell fast asleep — although not for long. Shortly before dawn he was nearly jolted out of his chair when a robin began to sing on the roof above Junior's cage. Professor Kellogg called it a day and went home to breakfast, without the recording. The owl was considerably more cooperative three nights later.

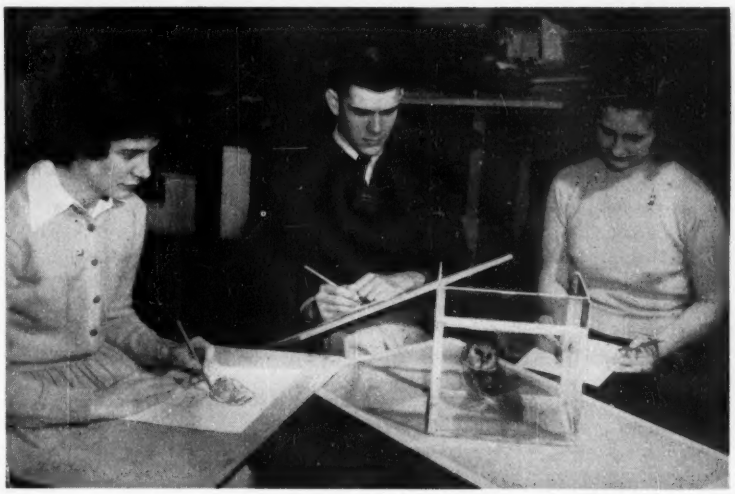
I have not heard the song of the saw-whet in the wild, although I often listen for it. Several winters ago we tried our luck at the Croton site. The sun had set and the thermometer was falling. After an hour of shivering silence I decided to make some squeaking, mouse-like sounds. Almost immediately we saw the tiny form of a saw-whet silhouetted against the faint glow in the western sky. The bird was hovering not three feet from us. It alighted close by — we barely breathed — and took another look as soon as I had renewed the squeaking. Then, uttering a peculiar, plaintive cry, the little fellow went off into the night.

In addition to the song, Junior gave an odd, gutteral, scolding note when anyone stared at him; it reminded me of the creaky call of a nestling screech owl. Getting that sound on tape was simple; I merely made faces at the owl while Dr. Kellogg recorded the notes.

As June, and the end of another school year, drew near, I began to plan Junior's release, but on the day before his liberation a professor asked if he might keep him a bit longer. Half reluctantly, yet half hoping that he would learn more about this interesting species, I gave my consent.

Junior was moved to spacious new quarters in the professor's cellar, which provided a large room with a window at one end. The owl quickly adjusted to the changed surroundings, eating and singing as he always had. But that window proved to be his undoing.

Because I had refrained from any attempts to tame him, Junior was essentially as wild in June as he had been six months before. He still made occasional efforts to escape. Evidently he tried to fly through the closed window one night, for the next morning the professor found him lying on the floor beneath it. He was dead.



Students and staff were fascinated by the saw-whet. Here he poses in a glass cage as members of the scientific illustrating class make sketches of "Junior."

As more and more of the people who had been charmed by Junior learned of his death, I was obliged to bear increasing criticism for not releasing him when my study was over. Far worse than their condemnation is the thought that, like a kind of ancient mariner's curse, every one of his kind that I see from now on will be "Junior," recalling this Saga of a Saw-whet.

What Was the Hemlock of Socrates?

By OSMOND P. BRELAND

One of the most famous deaths of all times was that of Socrates, a Greek philosopher, who lived several hundred years before the birth of Christ. Socrates, a wise and learned man, devoted much of his time to teaching members of the younger generations. Apparently some of his teachings were regarded as heretical, because he was charged with corrupting Athenian youth and condemned to death.

Under Athenian law of that time certain classes of condemned prisoners met their fate by being forced to drink a poisonous concoction called *conein* by the early Greeks. Thus Socrates died. According to some historians, the wise old man voluntarily drank the poisonous potion and calmly continued a discussion with some of his students until the moment of his death!

The expression "to drink the hemlock" is supposed to be based upon the circumstances surrounding the death of Socrates. In fact, in some accounts the statement is made that the famous philosopher died because of drinking a substance called hemlock. In parts of Canada and the United States there are well known evergreen trees known as hemlocks. Young hemlocks are often used for Christmas trees, and many people have wondered if there is any connection between these trees and the poison imbibed by Socrates.

Unfortunately, no one knows for sure the exact nature of the ancient Greek poison; although it is definitely known that the material was not obtained from our native American evergreens. No poisonous elements have been found in these trees, and in times past cakes were made by the Indians from parts of the soft inner bark. On the other hand, authorities who have studied the matter believe that the *conein* drunk by Socrates was derived from a plant totally unrelated to the American hemlock trees. This plant is poison hemlock, scientifically known as *Conium maculatum*. It is a member of the parsley family, a group that also includes such familiar vegetables as parsnips, parsley and carrots. Poison hemlock is an erect, branched plant that grows to a height of three to six feet. The stem is bright green with purple spots. There are clusters of small white flowers at the ends of the branches. These transform into small pods as the plant becomes older. A large fleshy root develops, and is quite similar to a parsnip. If the plant is bruised it gives off a peculiar odor that some people describe as being mouse-like!

Poison hemlock is native to Europe and parts of Asia, where it is widely distributed. It has become established in the United States and is relatively common in waste areas of the eastern part of the country and on the Pacific Coast. Most parts of the plant are poison at one time or another during the two years of its life. People have been poisoned by eating the roots, which they have mistaken for parsnips, and have suffered ill effects by mistaking the leaves for those of parsley.

The toxic principle of poison hemlock is called coniine because it is believed to be the same as the *conein* of the ancient Greeks. The poison affects certain nervous centers in the brain that control such important functions as muscular movement and breathing. In human beings the symptoms develop gradually and take the form of what might be called a creeping paralysis. The lower limbs are affected first and the paralysis slowly extends upward. The person usually does not have extensive pain, nor does he lose consciousness until just before death. In fatal cases, death apparently results from the paralysis of the respiratory nervous center in the brain, which in turn causes a complete stoppage of breathing. Specific treatment for hemlock poisoning should be given by a physician, although an emetic may be administered as an emergency first aid measure. This will cause the patient to vomit, which will relieve the body of any of the material that may still be in the stomach.

There has been considerable discussion as to the reason why the word hemlock is used for part of the common names of two totally unrelated groups of plants. The reason is easy to see in the case of poison hemlock, because part of the scientific name, *Conium*, is derived from a Greek word meaning "hemlock." Why the American evergreens should also be called hemlocks is not so evident. It has been claimed that the leaves of the two are similar and that this is the reason for the common name of the evergreen trees. However, this does not seem a sufficient reason to anyone familiar with both groups of plants. While to the untrained eye the foliage of the two might bear a vague resemblance to each other, a very active imagination would be required before anyone could confuse them. The real reason for these two totally unrelated and dissimilar plants being given the same common name will probably remain a mystery for some time to come.

Grasshopper Grievance

By PAULA ENNIS

Such careless talk I'll not reply to.
The size of *me* to be knee-high-to!

Can you open an oyster barehanded? A starfish can.

Beachcombing Can Be Fun

By PAUL W. KEARNEY

CAN you open an oyster barehanded? A starfish can. If you lost an arm or a leg, could you grow a new one? A starfish can. Indeed, if you cut a starfish in half and throw both parts back into the water, you will eventually have two complete starfish, each with the usual five arms.

The starfish is only one of the fascinating creatures to be found at the seashore. This the casual bather or stroller may never know. For the inquisitive, however, our beaches abound with intriguing wildlife. Look about you carefully, assume a little patience, and you may soon find yourself immersed in one of the most captivating fields of study that is known.

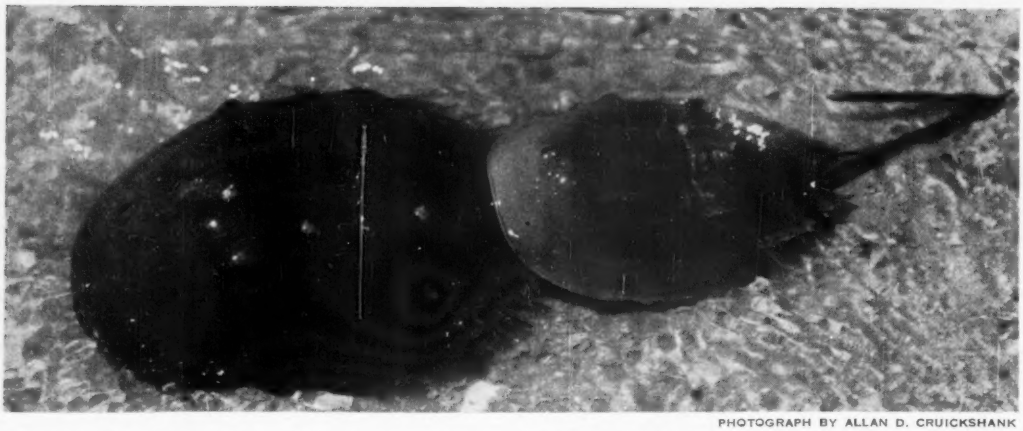
Probably all of us have seen starfishes, have been intrigued by their appealing symmetry — but never realized their remarkable powers. Turn a starfish over and you will see the secret of its strange mastery over oysters; each of its five arms is lined with rows of suction tubes, alternately filled with water, then emptied, to make or break suction. With these tubes this lowly invertebrate, weighing only a few ounces, can exert a pull of about three pounds. (With comparable strength, a 175-pound man could drag a load weighing more than two tons without benefit of wheels.) The water is taken in through a "filter," or madreporic plate, on the upper side of the body and piped to the suckers by a "plumbing system" radiating from the intake. This plate is easily distinguished, but many people mistake it for an eye.

When the star wraps its arms around an oyster, the scores of tiny suction feet take firm hold and pull with patient perseverance until the shell is forced open. With its hands full, so to speak, it would not be difficult for any other creature to eat — but not for the ingenious star. Unable to relinquish his grip, else the oyster would snap shut, the star inserts part of its stomach into the gaping shell and sucks the oyster out. So accomplished is the starfish at this operation that our Atlantic Coast oystermen pay tribute of around $250,000 a year to its depredations.

Look closely and you can see at the end of each starfish arm a red eye-spot. These eyes can scarcely distinguish between light and darkness. The starfish's sense of smell is also localized around these eye-spots, however, and is very keen. I have seen a starfish follow a chunk of oyster, tied on a string, all around a tank, even though the illumination was so dim that I could barely distinguish the bait.

The starfish's most enviable attribute is its ability to regenerate itself. Often you will see a star with four good arms and one stump — evidence that he ran afoul of a crab or lobster. But if you could keep it in a salt-water aquarium you would see that stump gradually grow into a full-length arm again. In fact, one branch of the family — the so-called brittle star — relies on this regenerative power for defense. This was demonstrated to me at Martha's Vineyard one day when I gently picked up a brittle star, only to have it blithely disconnect the arm and leave it in my fingers as it moved to safety.

Are you familiar with that accomplished engineer of Atlantic and Gulf coasts, the amusing little fiddler crab? Look for its burrows along the shore of some quiet bay or inlet. When you locate a score or more holes, one to two inches in diameter, this is probably a fiddlers' housing development, especially if there are little sand pellets lying around. Stand still for two or three minutes (you can talk, but do not move), and presently you will see pairs of little eyes on waving stalks appear like periscopes in the mouth of one burrow after another. Like chipmunks, the creatures will remain rigid in their doorways for a time, surveying the situation. Jerk your hand and they will vanish; re-



PHOTOGRAPH BY ALLAN D. CRUICKSHANK

The lure of beachcombing will begin to get in your bloodstream that first time you stand on a beach in the spring and chuckle at the ludicrous sight of a female horseshoe crab pulling a male ashore on her back.

main still and they will soon emerge to continue their endless forage for food, disregarding your presence and even clambering right over your feet.

An inch or so broad, these little fellows travel in accepted crab fashion, sideways. You will notice that some have one relatively large claw. These are the males, and it will not be long before they will rear up on their hind legs and beckon with this large fiddle bow. This is their idea of how to attract a lady — and it works.

The fiddler's real claim to fame is as the originator of the coffer dam. Those sand pellets lying around were taken out of the burrows by the crabs right after the last tide went out. Just before the tide comes in again — and the fiddlers never miscalculate — the whole group will repair to their domiciles and begin to replace the pellets in the doorways, firmly blocking them against the rising water. With the entrance thus prepared each fiddler will seek his dry sitting room at the end of a foot-long tunnel and meditate until the tide recedes. Whereupon the entire colony will reappear, pushing the pellets out of the entryways and stacking them nearby for future use.

One fascinating, albeit repulsive, citizen you may encounter at wading depth near shore is the fish who invented fishing. He employs both fly lures and live bait, and is called the angler. Limited chiefly to the Atlantic coast from Cape Hatteras to the St. Lawrence, this three- to four-foot *Lophius* is shaped roughly like a big ping pong paddle, and weighs up to forty pounds. If you see one — and they are easy to miss even at ten paces — he will probably be backed into a clump of marine foliage with his huge mouth, lined with rows of cruel-looking teeth, wide open. Dangling around both lips are fringes of wriggling, worm-like appendages; from the top of his head extends a thin whiplash, a foot or so long, with a tab on the end which floats idly in the current as the "fly." Passing schools of fishes spot these lures and go for them enthusiastically — and there is Monsieur angler's dinner! Even wild ducks have been found in anglers' stomachs.

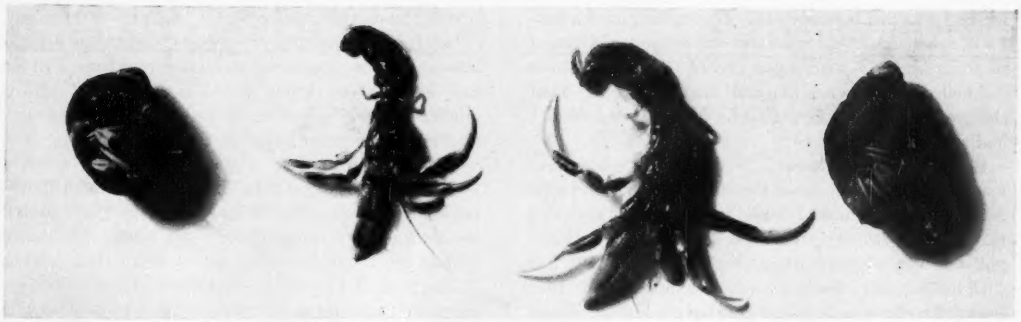
While you are looking for anglers, however, keep an eye out for other things. If a clump of seaweed suddenly starts to run away, it is a spider crab that has transplanted this foliage to its back for camouflage. Catch him, strip off the garnish, and lay it nearby; he will be very petulant until he can replace it with his foot-long claws.

Half-buried in the sand you may discover a box fish peering owlishly at you. Grab him by the tail and he will blow up as tight as a tennis ball. You can play catch with him.

If you are very, very lucky, you may encounter a herd of sea horses. My wife and I once found a nook on the bay side at Jones Beach, New York, where for months there was a regular corral of these unbelievable creatures. We would lie on the shore and laugh at their favorite game, in which one "colt" will flip his prehensile tail around another's neck and drag him through the water snap-the-whip fashion. We would marvel at the way they would suck tiny crustaceans off the eel grass with their long, soda-sipper snouts, or will dangle our hands in the water and let the adventuresome youngsters hook their tails around our fingers. The wise elders, of course, remained in deep water and never indulged in any of this 'teen-age seahorse play.

A colorful seashore character that will command your admiration — but can get you into a lot of misery — is the Portuguese Man-o'-War, which carries anesthesia with it. Sometimes found as far north as Cape Cod, this species of jellyfish is mainly native to warmer waters.

The thing you see first is the Man-o'-War's lovely, iridescent-blue float on top of the water — a pear-shaped, air-inflated bag perhaps four or five inches long, which can be raised or lowered at will. What you do



As soon as a hermit crab is able it backs into an empty shell and takes such a firm grip with the tail that you cannot pull one out without dismembering it.

not see from the surface is a vicious cluster of tentacles dangling beneath the body, often stretching thirty feet behind. Any hapless fish who mistakes these appendages for a clump of seaweed and swims into them is promptly given a shot of anesthetic that knocks him out. If the Man-o'-War feels like eating then, he will lift the unconscious victim to his mouth and devour it. But if he should decide to drop the fish, the latter will presently regain consciousness and swim away unharmed.

Swimmers who have brushed against the Portuguese Man-o'-War are all too familiar with the painful form of "marine poison ivy" that it can give. Even the more common jellyfish can provide a painful sting.

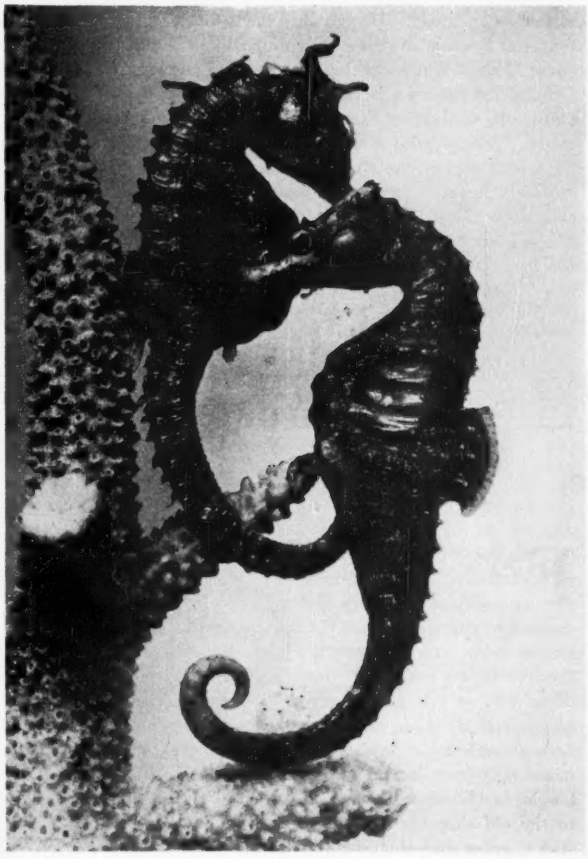
Yet ordinary jellyfishes are fascinating, too, even to casual strollers who often mistake their remains for the bottom of a broken bottle. Sometimes called "sun jellies" or "sea blubbers," they are 99 percent water and practically as transparent when their dead disks wash ashore and soon evaporate.

Alive, this daintily tinted, gelatinous plate is fringed with tentacles which you had best not handle. A small *Aurelia* may measure from one to ten inches around; the giant *Cyanea* (found from Cape Cod northward in late summer) comes five feet or more in diameter.

Around Choctawhatchee Bay, east of Pensacola, Florida, I have seen scores of aurelias "swimming" in schools near shore, resembling so many parasols being rapidly opened and half closed. Their fringes are short and brownish, and close inspection reveals four horseshoe-shaped clusters of egg sacs around the center of the disk, pink in the males and yellow in the females. A square mouth and the stomach are on the under side, the former surrounded by delicate membranes, which also have stinging cells. Most of them are phosphorescent at night. Day or night, they are fun to watch — but unless you are wearing gloves, keep them at arm's length!

A harmless and more amusing habitué of the shore is the hermit crab, originator of the house trailer. Common on all our coasts, the hermit is hard to see if you keep on the move, yet the beach may be alive with them. My earliest encounter was at Beaufort, S.C.,

If you are fortunate enough to encounter a "herd" of sea horses you will have hours of fascinating seashore watching.



where I was picking up shells. Having acquired a hatful of specimens, I spread them out on some driftwood to study them — whereupon one of the "dead" shells suddenly started to run like mad along the sand! That shell, of course, was inhabited by a hermit crab that I had not noticed.

Hermit crabs are born with their rear ends unprotected by the tough armor that covers their fore parts. As soon as each is able, it backs into an empty shell and takes such a firm grip with the tail that you can not pull one out without dismembering it. It drags this shell behind, using its forelegs for traction. As a hermit grows, he changes to larger and larger shells; consequently, you will find hermits in everything from little periwinkle shells the size of your fingernail up to Florida's twelve-inch, five-pound queen conch.

When threatened, a hermit crab will withdraw into his trailer and block the door with his right claw — which is larger than the left — so that nothing can follow him in or poke him out. This is a good defense against everything except bottom-feeding fish, who gulp up shell and all. But the wily hermit has taken measures to deal with the bottom-feeders, too. He has evolved a working agreement with a neighbor known as the sea anemone. The sea anemone's short, feathery tentacles contain stinging cells much like the Portuguese Man-o'-War's, making him such a hot mouthful for any fish that he is rarely molested. The hermit plants one or more of these polyps on top of his house trailer — and defies the bottom-feeders. In return for this protection the crab provides the anemone with mobility, hence a greater food supply. The anemone can move about, of course, but when the progress of one was clocked at the old Aquarium in New York, its top road speed was calculated as equivalent to one mile in 82 years. Obviously, both parties to the contract benefit from this rather static association together.

Safety is not the only thing that concerns the hermit, however; there is also the sanitation problem. To take care of that, our canny friend makes a deal with a marine worm, which takes up its abode inside the shell trailer and, in return, handles the housecleaning. The worm eats the hermit's debris and thus gets its provender with little effort. In the large Florida shells occupied by hermits, these colorful worms, *Nereis fucata*, grow to a length of seven or eight inches. You will seldom see them, however, except when their host is feeding; then they often lean out to grab whatever crumbs he may drop.

Such random smatterings of beach lore barely scratch the surface, of course. And the animals I have mentioned are not served up on silver platters; you must seek them out. Coney Island on a busy Sunday would scarcely be a likely hunting ground; and a beach with heavy surf is not good any day. Along an open shore, low tide is the best time, especially when the waves break gently. But the most fruitful spots are rocky tide pools, inlets, bay shores, or the fringes of salt marshes.

The lure of this sort of beachcombing will begin to get in your bloodstream that first time you stand on a beach in the spring and chuckle at the ludicrous sight of a female horseshoe crab riding a male ashore on her back and towing a string of three or four other males beoind, each holding the other's tail. You will awake to the intriguing possibilities still further when you find yourself hypnotized by a "covey" of scallops flitting zig-zag through the water like butterflies, their rows of exquisite azure eyes flashing in the sun. And the chances are you will be trapped for good when you witness the fabulous phosphorescent light show staged by a hundred jellyfishes in a tide pool on a moonless night.

Mother Hubbard Kingbirds

By M. A. SHEPARD

Photograph by the Author

For some time the old shoe had been in the barnyard shed gathering dust. Then, as much out of curiosity as anything else, someone in the family decided to nail it to the side of the shed, under the protection of the eaves, to see what might happen. It was thought that a family of wrens might fancy this as a home site, or this unconventional nesting place might be ignored by birds entirely as quite out of keeping with avian ideas about a proper place to live. While wrens may have looked over the site, it was a pair of kingbirds who signed a lease. They took a quick liking to the old shoe and set to work filling it with small sticks, grass and such, and there raised their brood.

A Tornado's Toll

By H. ELLIOTT McCLURE

THE evening of July 8 had been warm and sultry, with a few ominous clouds hanging over the northwest horizon. The townsfolk of Portsmouth, Iowa, gave no thought to the approaching summer squall, other than to close their north and west windows when they retired. Heat lightning flickered along the horizon as the lights of the late readers and card players snapped off. The quiet little town of three hundred inhabitants, situated on the southeast slope of a gentle hill, crowned by a Catholic church and school, settled itself for the night.

At three in the morning the community slumbered; only a night watchman at the railroad station was awake. Robins and mourning doves were snuggled in their nests or roosting on nearby perches, woodpeckers huddled in hollow trees, chimney swifts clung to the church and school chimneys, wrens were in their neat houses, and a flock of English sparrows twittered sleepily in a small cherry orchard. Other English sparrows were in the haven of their bulky nests in barns and eaves. An occasional toad hopped lazily beneath glowing street lights to snap up bewildered moths, and a cottontail rabbit nibbled some choice lettuce in a verdant vegetable garden. The soft scent of the many flowers about homes and gardens enticed a few graceful Luna and Cecropia moths. A fox squirrel peered out from its leaf nest at the gathering storm and noticed a red bat sweep past a swaying street light.

Without warning, householders were awakened by an approaching freight-train-like roar. Before they could rise to rush to basements or storm cellars the screaming wind was upon them. Bedlam broke loose as trees crashed about them, window glass shattered over their beds, roofs groaned and shingles tore away. Those who could crept across swaying floors to the basement, or huddled under beds to avoid flying debris and falling plaster. For thirty long minutes the terror continued, and in typical tornado fashion the winds were from the southeast, although the storm was moving from the northwest. These were counterclockwise whirling winds of the northern hemisphere.

Just as it seemed that every home and building would be leveled, the wind suddenly ceased, to renew as a strong blow from the northwest, and the skies opened up. Hail and rain fell in torrents. A basement, the door to which had been ripped away, was filled level full with a drift of hail and leaves. For two hours the torrent continued, with five inches of rain pouring

Tornado damage to homes and other buildings by the storm that struck Portsmouth, Iowa, July 9, 1940. At the left, a dead rabbit and some of the many dead birds collected and recorded to indicate the effect of the tornado on wildlife. These data showed that there was a much heavier toll from a tornado that struck during the night than one of equal severity in the daytime.

What happened to this Portsmouth, Iowa, cornfield gives some indication of the damage wrought by tornado and hail.

through ruined roofs and upon beaten trees and lawns.

With the cessation of the violent winds citizens began to take stock and to seek their dead and injured. In flying nightshirts and raincoats they dashed from house to house to give aid. But to their amazement there were no dead and only a few injured in one family whose small house had collapsed.

Not so with the lesser creatures. Their crushed and maimed bodies lay beaten into the mud as dawn broke amidst a scud of clouds, tag ends of the now exhausted storm winging southward. Except for the soft wind sighing through tortured limbs there was no sound. A great, unnatural silence stole through the dawn. Sunrise flamed in crimson beauty, but there was no morning chorus to greet it. The golden voices of daybreak had been stilled. There was not even the strident chatter of English sparrows from the cherry orchard; 108 lay hushed there in the broken grass.

After the harrowing night the villagers looked out to see a winter-like scene. Trees stood stark and naked. No leaves adorned their broken branches, no flowers or vegetables grew in the gardens, no grass stood up in the lawns. Over all of the soil a heavy deposit of vegetable detritus and debris from shattered buildings lay several inches thick. Ninety percent of the leaves were gone from soft maples, apples, catalpas, Chinese elms, walnuts and ash trees. A few leaves remained on mulberries, box elders, honey locusts, American elms and silver poplars. Only the evergreens still retained their regality. One out of every ten trees lay prostrate or shattered.

In the tiny, one-acre city park a red-headed woodpecker clambered from a nest hollow and flew groggily to a nearby tree. Beneath him rested his associates of the day before. A bruised toad hopped among the dead birds — 9 bluejays, 17 mourning doves, 6 English sparrows, 6 bronzed grackles, 4 Baltimore orioles, 4 robins, 3 screech owls, 1 flicker, 2 eastern kingbirds, 2 redheaded woodpeckers, and 1 downy woodpecker; 55, in all, in one small neighborhood.

From beneath twisted shrubbery on one lawn a robin paced, searching the debris for his breakfast. Behind the toppled church steeple amid school gardens and lawns, another robin limped wearily about, dragging a torn wing. Here there had been more trees and the wildlife toll was greater; 63 mourning doves, 65 robins, 6 flickers, 4 English sparrows, 1 brown thrasher, 1 chimney swift, 3 eastern kingbirds, 2 Baltimore orioles, 1 black-billed cuckoo, 1 bronzed grackle and 1 catbird. A cottontail rabbit had found no haven, nor had a fox squirrel and a red bat. Here at least 151 animals had died.

When interviewed one woman spoke of 40 dead birds in her yard; another had picked up 15; still another 6. What of the chimney swifts and swallows? What of the open country birds? How many died? In the town probably a thousand; maybe five thousand.

And what a forlorn remnant began this new day to reconstruct and to carry on!—the one red-headed woodpecker, 10 mourning doves, 3 house wrens, 1 eastern kingbird, 2 robins, 20 chimney swifts, and about 50 English sparrows, which had weathered the storm in barns — eighty-seven birds in all.

Probably after the shock of the storm and of injury had worn off, birds of the surrounding damaged area sought the town for shelter and for mates, and life carried on. A week after the tornado live birds noted included 8 mourning doves, 5 red-headed woodpeckers, 4 house wrens, 1 downy woodpecker, 5 barn swallows, 1 starling, 1 robin, and many chimney swifts and English sparrows. Most of the red-headed woodpeckers seemed to have nests, the wrens were busy with household duties, the English sparrows had new bundles of straw in the barns, a Baltimore oriole nest was seen in a box elder, and two dove nests containing their white eggs were found.

Two weeks after the storm there was much activity among the little band of bird survivors. Nests located included 10 English sparrows, 2 Baltimore orioles, several wrens, several red-headed woodpeckers, 1 starling, and 13 mourning doves. And the bird population was increasing, too, 94, not including the English sparrows.

By the middle of August it was evident that there had not been the expected immigration into this depleted area from surrounding fully stocked regions. The Portsmouth birds were mainly survivors and their subsequently reared families.

At Portsmouth the birds (Continued on page 330)

A Turtle Tale, or the Life of Riley

By ROBERT W. SCHERY

Riley loved to sun himself on his special log in the aquarium under a 100-watt lamp.

THE real life of Riley must have begun somewhere on the clean banks of the North Fork in Ozark County, Missouri, a bit below the famed Double or Rainbow Spring, one of the "seven wonders of the State." This spring throws its 100 million gallons daily into the clearness of this fast and tumbling stream, which scours its channel to limestone bedrock in what is perhaps the finest forty miles of river wilderness in the mid-West. But he had not been named Riley then — and probably was not even seen by a human being until he had become a veteran river swimmer of more than a year. It was then that man entered his life. Even a sleek canoe could not suddenly "hold up" for a turtle in a ten-mile current, but the superbly clear water of the North Fork in September can ill conceal even so small a mite as a few-month-old geographic terrapin, *Malacoclemmys geographica*. With a man overboard in quick pursuit into the welcome coolness of the spring-fed stream, Riley was an easy capture, for crystal clearness of the water permitted following his every movement, and the bed-rock bottom offered no refuge.

But it was not yet to be the "life of Riley" for this intriguing young terrapin. Fate had in store six hours of unfamiliar canoe travel under blistering sun, and an additional seven hours by auto, protected from dessication in the first lap only by the dark confines of a wet canvas shoe. Two hundred miles later, northeast of the North Fork, the more formal life of Riley commenced, and a duly named geographic terrapin from an Ozark wilderness was introduced to urban society. He was to become, in a few short weeks, as sophisticated a turtle as ever participated in the daily and social life of a suburban home.

Riley had there as his domain a fifty gallon aquarium, inhabited also by such elegant companions as angelfish, mollies, swordtails, moons, zebrafish and the ever-ubiquitous guppies. Eelgrass grew luxuriantly from the sand bottom, while an underwater "forest" of *Anacharis* offered retreat and browsing range for a turtle on the prowl in search of snails. Bladderwort, known for its ability to trap small crustaceans and even fish, and floating duckweed completed the plant complement, and there was, at the beginning of Riley's occupancy, an array of snails, which, to judge from Riley's habits, can be hors d'oeuvre, main dish, and dessert at a geographic terrapin banquet. Any except the largest of snails, such as the Japanese type, are crushed to bits in the strong mandibles of the turtle. The shell fragments are sifted through and largely "spit out,"

It was in such an Ozark clear-water stream that Riley, the geographic terrapin, was found and to which he was finally returned.

A geographic terrapin only a few months old. Riley boasted an inch-long shell when found; grew to three inches in a year, after two molts.

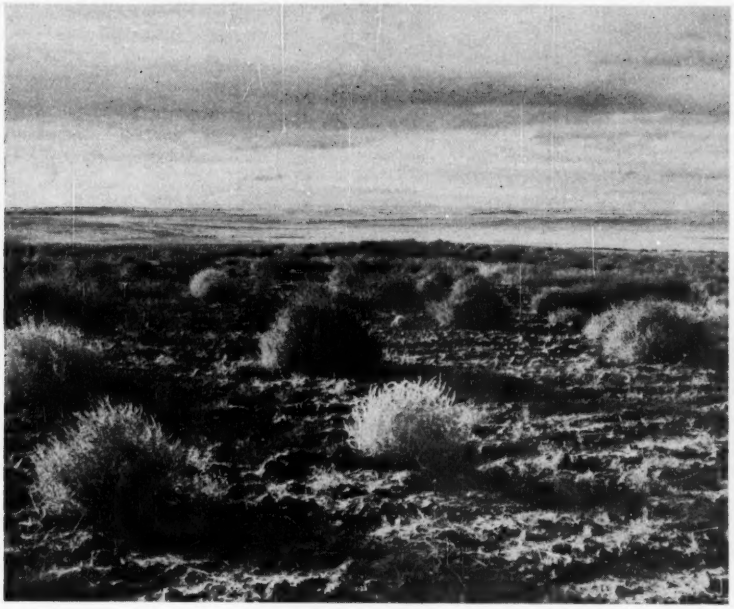
and the meat of the snail consumed with relish. From time to time the snail population in Riley's aquarium was replenished from a pond, so that Riley's diet need not be deficient in calcium, should such be necessary in the form of snail shell fragments for the growth of turtle plastron and carapace and for general turtle well-being. We human beings continuously consume, like it or not, foods "purified" of mineral and vitamin, and then later are allegedly given mineral and vitamin enrichment. But since no such provision for enrichment has been made for the fare available to suburban turtles it was deemed wise to duplicate Nature's bill-of-fare to the extent of snails.

Of course, snails were not always available in quantity, so that Riley soon was upon other bill-of-fare. The children provided occasional earthworms, but the ever-present food for turtles in our household was the horse-meat supply kept for the dog, Tugs. Riley seemed well satisfied with horse-meat, used lean so as not to make the water surface oily. In fact he soon became so accustomed to the red color of horse flesh that occasional white tidbits of fish or shrimp had to be rather persistently urged upon him before acceptance. At no time did Riley seem to bear any ill will towards his fish companions, and no casualties in fish population ever occurred on his account, even though the fish surrounded Riley at feeding time, seeking any fragments of meat that might fall from his mouth. A red moon, swordtail and the angelfish eventually became so bold as to grab meat from between Riley's very jaws, a somewhat disconcerting experience that often left Riley in a quandary as to whether to give chase or to accept fresh supplies from the hand that fed.

And it was literally hand-feeding as far as Riley was concerned. A rule of the household was that no more food than could and would be consumed immediately by the occupants was ever to enter the aquarium — for cleaning a fouled fifty-gallon tank without soiling a well-kept room in a home is no mean task. Riley soon acquired the habit of swimming at once to the feeding corner of the aquarium upon observing a person enter the room, and of paddling there madly until given a morsel of food. On such occasions Riley did everything but bark in the fashion of a dog "speaking" for its supper. Such confidence in the human clan helped make Riley's life the life of Riley. There were few in the family, or even among habitual guests familiar with this reptilian mite, who could refuse his begging. Children and grown-ups alike beat a path to the refrigerator for fragments of horsemeat for Riley. These he would take from the fingers, either above or below water. Riley's sight was evidently adjusted to underwater life and diffraction patterns, much as is man's to terrestrial existence. Just as objects under clear water appear closer, or at a reduced angle as man sees them from above, apparently Riley saw objects above water in a similar degree of alteration. His grabs for meat from a finger held above the surface were invariably somewhat too far towards his top side. But under water his boarding house reach was precision itself.

All fresh water turtles seem to delight in sun baths. Riley was no exception. A river birch log was fashioned for him, held in the crotch of an elm branch so that one end was immersed but the length slanted out of water. About eight inches above this was placed a desk lamp with a 100-watt bulb. Riley delighted to climb on the log and "sun-bathe" for hours on end whenever the light was on. Sun-bathing was equally acceptable day or night, and frequently on the occasion of parties this light and its companion at the other end of the aquarium stayed on much of the night. Such extravagance, of course, was not alone for Riley's sake, for it "showed off" the aquarium and fish most attractively. Occasional periods of lighting were likewise necessary for proper plant growth, since the aquarium in a corner of the study received little natural illumination.

When Riley entered the household in September, 1949, he was a mere inch long "terrapinfant," measured along the shell only. By summer of 1950 he was nearly three inches. During this period he underwent two molts, in which the chitinous outer scales of the carapace were shed once, and skin surrounding head, tail and limbs twice. This skin of the unprotected parts shredded away all at once, (Continued on page 330)



First comers on newly abandoned plowed fields, the tumble-weeds make magnificent growth in the absence of competition from other plants. Here they await the loosening winds that will take them, in fall and winter, across the endless plains.

The Tumbling Throng

By DAVID F. COSTELLO

Illustrations by the Author

Most of us are inclined to think of plants as sedentary things, accustomed to sit much, and long. The trees outside our windows are calm and tranquil; we expect to see them there, in season and out of season. The lowly dandelion holds its stance until its seeds are blown, until its leaves are brown and withered in the summer heat. Even the hepatica, early riser in the spring of northern woods, presents its red-tinted leaves beside the same footpath in fall. But not the Russian thistle. Here is a traveler; and one that never really lives until it dies.

Inconspicuous in youth, touchy as a porcupine in blooming maturity, it bides its time through summer rain and drought. Still stiffly rooted when autumn flowers are yellow, it robustly guards its fields and fence rows. Not until frosty mornings and the jostling winds of late fall loosen it from its moorings does it become a thing alive and full of antics. But with freedom gained, the whole wide landscape is its domain.

This immigrant from Russia apparently was first observed in the United States in Bon Homme County, South Dakota, about 1873. By 1895 published reports indicate that it had become established in every State in the Great Plains region. It now occurs throughout the West and in Southern Canada.

In order to appreciate this wanderer, you have to live with it, and examine it closely. I have never had the patience to weigh the leaves, stems and seeds of a Russian thistle plant. I am willing to take the word of other botanists that a big one can produce 20,000 seeds, can weigh nearly seven pounds when dry, can produce 12,000 leaves, 45 feet of branches and 63 feet of roots.

The Russian thistle, like old Nereus of the sea, has many forms. Most familiar is the much-branched, bush-like globe, or "tumbleweed," that has made it one of the world's noted immigrants. Its adaptation to run before the wind, coupled with a prodigious seed supply dribbled out over a period of months, explains its early appearance on abandoned fields and denuded areas throughout the plains. Its scattered offspring, when competition from their own kind or from other plants is lacking, reach proportions varying from inches to more than five feet in diameter.

Less familiar are the youthful forms. I remember riding with a business man one day and his remark concerning the velvety grass patches in a denuded pasture.

The young greenish flowers of Russian thistles turn pink at maturity, in bright contrast with the deep green of the spiny bract-like leaves.

"What a wonderful putting green for golf," he said.

We stopped to examine the "grass" more closely. The patches were millions of Russian thistle seedlings. Countless seeds had germinated and the inch-long succulent leaves virtually touched one another, forming an iridescent black-green carpet in the morning sun. My friend's hope for a new grass discovery was dashed. I explained that most of the innumerable seedlings likewise had no hope.

They were so numerous that the resulting competition for moisture and light, if drought came, would inevitably result in the death of practically all before they had opportunity to produce flowers and seeds. This frequently happens on bare fields and denuded pastures and ranges. When life-giving rain is long delayed, the entire stand wilts, dies, and eventually is replaced by deeper rooted plants in the natural succession toward a grass cover on the land. Thus, nuisances that they are at times, Russian thistles can and generally do cure their own evil by the very superabundance of their own populations.

Usually the seeds germinate in spring, although seedlings sometimes appear in mid-summer when moisture conditions are favorable. At this early stage cows relish the plants, which are high in protein content, even when palatable grasses are available. The narrow two- or three-inch leaves, however, are not long lived; as the plant grows, new leaves are added, and these resemble the spiny bracts with which the stems later are so copiously equipped.

One day in July, I was showing a group of land appraisers over our pastures. One, with a scientific turn of mind, had borrowed my hand lens, and was busily turning it on insects, pebbles, and all manner of flowers, remarking on the astonishing variety and beauty of their colors. I had him try it on a Russian thistle flower, and he was more intrigued than ever. Like most people he had never looked at the flower of a weedy plant.

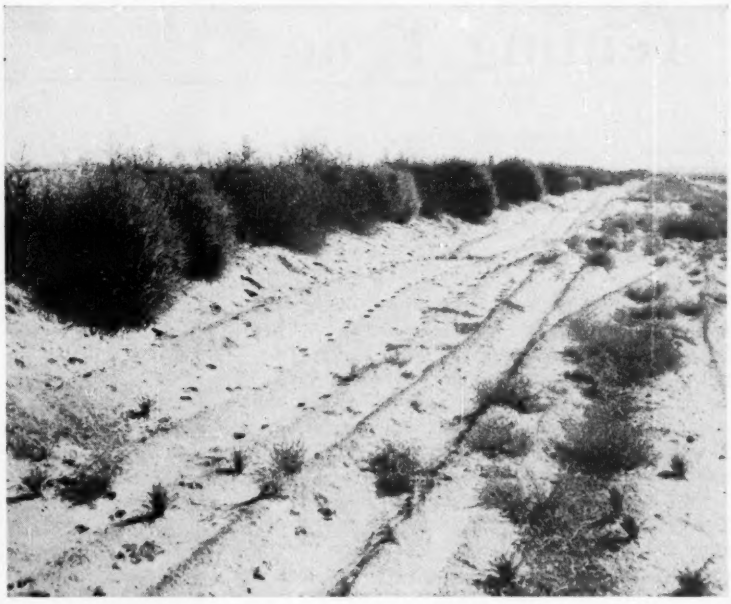
Russian thistle flowers are small, papery structures that develop singly in the axils of the leaves from mid-summer until autumn frost. A pistil and five stamens are present, but petals are absent. The five sepals are green at first, but turn pink at maturity. The stigmas mature a few days before the anthers, which at first are greenish but at emergence are plump yellow objects of beauty.

The single-seeded fruits are somewhat top-shaped and are enveloped by the calyx, which enlarges in the shape of a small cone. Wings develop on the sepals as the fruit matures, but there is some evidence that the growth of wings is more related to light than to time of seed production.

Nature has nicely provided for the scattering of seeds. As in so many instances she does not put all her eggs in one basket — nor all her Russian thistle seeds in one spot, or even one field. A nice demonstration of this can be had by shaking a thistle on a sheet at any time during the winter. A small crop of seeds can always be obtained. A few enterprising botanists have investigated this seed retaining habit by placing a plant in a sack and suspending it to be buffeted by the wind against a wall or house. Thus a periodic harvest of seeds can be obtained throughout the winter.

The last seeds to appear — and some are never released — are those on the older parts of the plant, where the stems or branches have partially expanded around and over the fruits. Occasionally one finds branches that have been covered by drifting soil. From these, seedlings grow without the fruits becoming detached from the remnants of the parent plants.

The superabundance of Russian thistles is frequently a serious matter. In great drifts along hedge rows and shelterbelts, they create a fire hazard for trees, shrubs, and property in general. In high winds, when they have accumulated in millions, they push down fences



Roadside borders of Russian thistles lend summer beauty to otherwise monotonous stretches in the Great Plains, and provide shelter for rabbits, mice, and birds. In maturity they catch the drifting sands, sometimes make the road impassable; or wander beyond the horizon, according to the whims of the winds.

or catch drifting sand until soil levees are built so high that fields are invisible from the country roads.

Even the law is affected by tumbleweeds. In Colorado the sheepmen and wheat farmers, at a public hearing on a proposed new fence law, lined up against cattlemen, because they wanted the responsibility for trespass and damage by livestock placed on the owners of the animals. But the cattlemen countered with the argument that it is the wheat farmers who are responsible for the trespass. In years of crop failure, and as a result of plowing, the weeds increase in numbers and help the wind push fences down, creating situations that end in lawsuits. To date, no one has repealed the law of the wind, or the tumbling of tumbleweeds.

A great many landowners, however, could profit by the knowledge that a clean fallowed field accumulates moisture for subsequent crops, and grows no Russian thistles. Livestock growers also could profit by the knowledge that keeping pace with the recovery of vegetation by constantly increasing the rate of grazing retards development of desirable plants, and frequently leads to depletion of both vegetation and soil.

The disappearance of Russian thistle stages from newly abandoned fields generally occurs within three to five years, if such areas are not greatly disturbed by livestock. The thistles are frequently abundant on misused lands after ten or fifteen years, and the grazing capacity is usually lower than it was in the second or third years.

In the dooryard of our experimental range, north of Greeley, Colorado, the Russian thistles have remained for more than fifteen years, chiefly because we drive the cattle past our cook shack for the monthly weighing. Their sharp hoofs thus periodically stir up the earth and destroy the perennial grasses that renew their efforts to survive each year. Likewise, the green mat of thistle seedlings that develops each spring never reaches maturity, but at the edges of the driveway numerous globe-shaped thistles reach gigantic size, with the aid of runoff from summer rains. Here numerous cottontail rabbits build their forms, and during summer evenings we come to know the individual youngsters as they creep into the open at nightfall.

One autumn day, I learned a more sinister aspect of our tumbling neighbors. A deep ditch with vertical banks that led into Cobb Lake, a few miles east of the Rocky Mountains, had become clogged with Russian thistles. Wishing to cross the ordinarily dry ditch, I jumped on the tangled mass. To my consternation the matted weeds magically parted. I found myself in suffocatingly cold water and soupy mud. As I clawed at the crumbling vertical bank I slowly sank until only my head and hands were clear. My young son saved me by thrusting his loaded shotgun, muzzle first, into my hands while he held the stock and struggled almost hopelessly on the bank to pull me out. The details of how we eventually succeeded, I can hardly remember.

I recall more pleasant experiences on this same lake. One windy November day while with two companions, Noel and Hal, we observed what appeared to be a flock of large birds moving with the waves in our general direction.

"Geese," someone said.

We crouched in the matted wind-tossed weeds at the southern lake shore, excitement mounting by the minute as our birds steadily grew larger, swimming and drifting before the gale. Then, with sheepish grins, we stood and watched a flock of Russian thistles drift to shore, rise out of the water as they touched the gently sloping bottom, and spin madly away.

Sometimes when the chinook wind begins at night, my first thought is, "Now the thistles will come to life." When these magnificent winds rush down from the Rockies and eastward over the plains, nature is roused to action. Sometimes (Continued on page 332)

Tenting Time

By WILLIAM GILMAN

Photographs by Elinor Gilman

SOMETIMES man has to step in and favor the prettier side of Nature over her more unattractive aspect. This is especially true in spring when tent caterpillars swarm through fruit trees, ornamentals and shrubs.

Almost any year, you can find some bushes and smaller trees around the home completely defoliated by the repulsive leaf-eaters, but these hungry caterpillars are at their worst every ten years or so. Judging by their abundance last year, experts figure that this spring will see the pest at the peak of its current cycle. That is why "forewarned is forearmed," and we are aided by the fact that the insect can be controlled.

First, it is necessary to recognize what they are. The "tents" that appear after mid-summer are built by another and less serious pest, the fall web-worm. Moreover, the tent of that caterpillar wraps the ends of branches, instead of filling crotches the way the tent caterpillar's web does.

The latter pest appears only in spring. Although called eastern tent caterpillar and apple tree tent caterpillar, it is common throughout the United States. The leaf-eating crawler is the larva of a small moth that has reddish-brown wings with white bands.

A regular spray program controls these insects in commercial fruit orchards. Around the garden and along the roadside, a practical procedure is to find and destroy the colonies before they hatch. The masses of shiny, gray-brown eggs overwinter around small twigs, very often on apple or wild cherry trees. Such infested twigs should be pruned off and burned with the tents.

To destroy tent caterpillars it is best to catch them with flame while they are still using their webs. Small ones in this tent have started eating apple leaves and blossoms. In a month, unless killed, they will depart, having finished their work of destruction.

Most gardeners, however, fail to act until after the tiny caterpillars have hatched and begun chopping the young leaves, because it is then that the tell-tale ugly tents appear. These are tough, web-like, community nests built where small branches fork. The dark caterpillars return to a nest nightly, and in rainy weather, for protection. In a month, they become two inches long, black with a white stripe down the back. By then it is too late to control them for then they will crawl away to pupate.

This is why these caterpillars should be destroyed while still in the web. The easiest way is to prune off the branch and burn it. Or, if the tent is within reach, as is usually the case, one can use one's flame-thrower, or borrow one from a neighbor. Directing the hot flame against the web for a second or so need not hurt the shrub or tree. The web and its occupants drop to the ground where the fire soon finishes them. Vigilance and persistence combined will enable you to keep these hungry insect pests in check and their unsightly tents at a minimum.

Such a flame-thrower gives quick and effective relief from tent caterpillar infestation.

Guardians of the Leaves

By JOHN LINDSEY BLACKFORD

Photographs by the Author

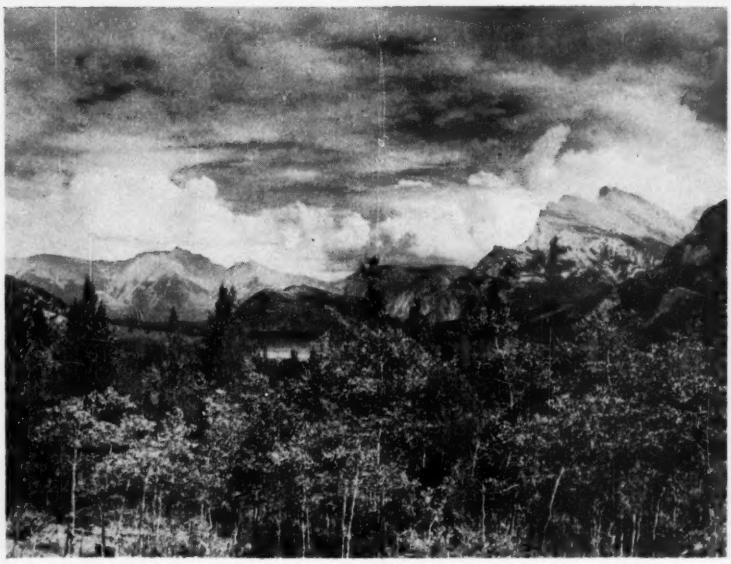
Following the gold-dusted catkins, many-veined leaves of mountain alder unfold to form bowers of densest stream-border shade.

A GAY, tinkling roundelay, like the sprightly notes of an old music box, constantly overflows the bowered greenery of elm and maple, and the breeze-blown crowns of birch and willow throughout spring and early summer. It is the rippling roundelay of the warbling vireo, who sings as he works, for all the while he destroys myriad leaf rollers, span worms, and aphids. His song is one of Nature's "extras;" but his work is undoubtedly more pressing than any other in all the world. Did not the green chlorophyll of the shimmering leaves continue to unite radiant energy of sunlight with carbonic acid from the air and with earth-minerals drawn up from the soil by thirsty roots below, all life on this planet must soon cease. By one magic key, the mysterious secret of the chlorophyll, Nature unlocks life for every living thing. While the sun shines, each leaf of grass and blade of grain, each conifer needle, and verdant broadleaf is a miniature laboratory. And so that this primary life process may never fail, Nature entrusts to an army of small feathered caretakers the vital guardianship of the leaves.

Specialists among these leaf-protectors are the vireos, a host of warblers, and the tiny, thumb-sized kinglets. In fact, so closely do we identify the warbling vireo with his leafy charges, we call him "greenlet;" and his very name of vireo means "I am green."

The life story of a deciduous leaf, in temperate climes, is all told in little more than five intensive months; frequently in three or four. Matching the rhythm of bursting bud, uncurling of tender leaflet, maturity under the summer sun, swift turn to gold or scarlet, and the fall of the dead leaf, brown and sear, as a plaything of autumn winds, is the pulse of a vast avian migration. Midget warblers, flycatchers, and kinglets, larger tanagers, orioles, thrushes, and fearless kingbirds wing back from far tropic and southern latitudes. Miraculously they spread northward across the continent to guard the growth of the new leaves.

The ruby-crowned kinglet arrives to shout his boisterous medley in early April while the woods appear yet bare; but infant leaves are unfolding, and although it is hard to believe, new hordes of aphids already attack their fragile life. Fluttering in air about the foliage like hummingbirds, the ruby-crowns destroy these sapsucking plant lice. Calaveras warblers soon follow to voice insistent reedy notes from evergreens and birch groves. Cassin's vireo and orange-crowned warblers return. Deep-veined alder leaves are freshly opened to greet the drab little fellow



In the swirling silver-green of extensive aspen groves ranging the high Canadian Zone of our western mountains, the lutescent and orange-crowned warblers are at home. Above, the white boles and gleaming foliage of aspen are found with Engelmann spruce and lodgepole pine upon the majestic slopes of the Rockies.

The handsome, orange-crowned eastern kingbird leads an unrivaled career of flycatching along green river banks and borders, which he interrupts only for raids upon passing hawks, crows and other suspect raptors and corvines. Chief of the tyrant flycatchers, the kingbird destroys weevils and wasps, blister beetles, rose-chafers, crickets, gadflies, caterpillars and grasshoppers. Ninety percent of his fare consists of insects, mostly injurious kinds.

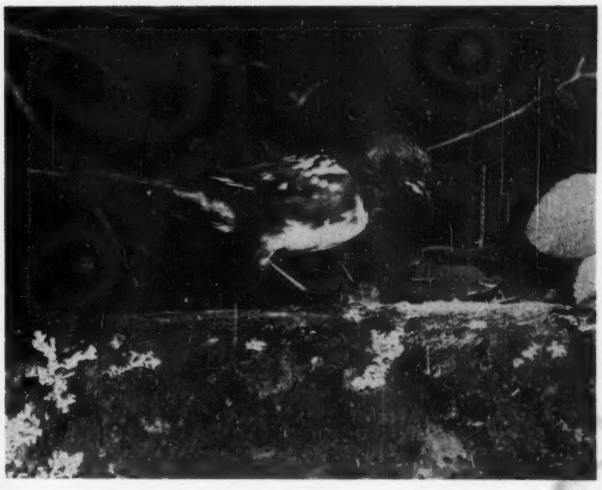
named for them; and loyally the alder flycatcher follows their green paths up steep ravines until, in the highest alder swamps and stream borders, we hear his summer note of unintended disconsolation: "weep-here." Pollen-colored yellow warblers effervesce from the lush greenery. Tennessee warblers hurry north thousands of miles to feed upon the enemies of Alaskan foliage. And hermit thrush and veery come to vary insect hunting with the choiring of golden song.

The cheerful guardians of the leaves are never done with their stupendous task. Countless injurious in-

Typifying numerous, small, gray gnatcatchers and flycatchers that police the forest's insect-busy air, Wright's flycatcher (below, left) is partial to half-wooded parks, aspen groves, leafy understories, and mountain chaparral. The task accomplished by these midget caretakers of the trees in preying upon winged adults is one of Nature's methods of preserving the balance against prolific, leaf-destroying insect forms.

To his duties as protector of woodland and grove, the red-eyed vireo (below, right) adds the skill of artist and architect. The cup-like nest is swung by plant fibres from the fork of some slender branch. Cocoons, spider webs, and bits of wasp's paper often ornament the cradle, which have here been supplemented by deer moss and the delicate bark-curls of silver birch. The varied phrases of the red-eye are voiced all day long through the summer's oppressive heat; and just as constant is his guardianship of the rustling leaves.

Probing the topsoil for grubs and searching among fallen leaves for beetles, the towhee or chewink (right) is a ground forager and woods-floor caretaker of unsurpassed ability. He is the final destination of an amazing number of canker and cutworms and caterpillars.



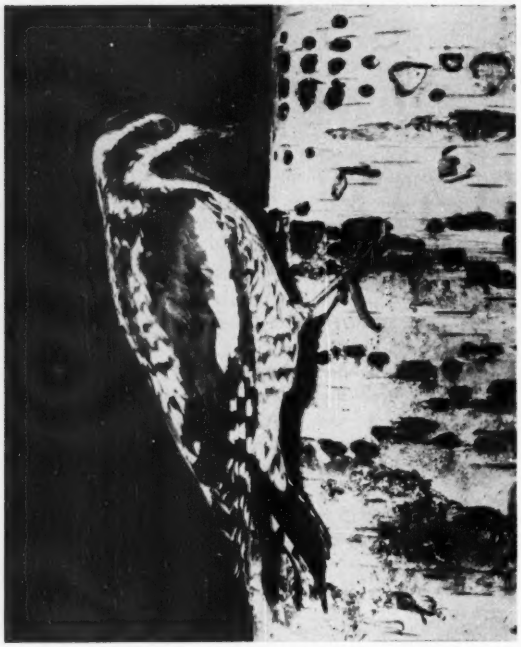
sects not only live upon but measure life cycles by, modify physical forms to, and evolve their habits within the cool, green habitat of the leaves. Skeletonizers, defoliators, leaf-gall worms, leaf hoppers, tent caterpillars, twig borers, leaf miners, jumping leaf lice and a multitude of other shady characters are parasitic upon broadleaf foliage, while a host of kindred forms attack the resinous leaf-needles of the conifers.

The war against them is pressed not only by leaf-tinted specialists gleaning among the bowered branches. Nighthawks, sweepers of the upper air, prey upon adult flies and moths winging above the forest crown. Ground foragers, like the

The fiery orange, trimming the male American redstart's suit of black, blazes among the leaves like a flickering flame in the summer shade. This colorful bird (above) is a member of the warbler family, hence a faithful guardian of the leafy green. This nest is concealed in osiers and willows, amidst the dense understory favored by these friend of the leaves.

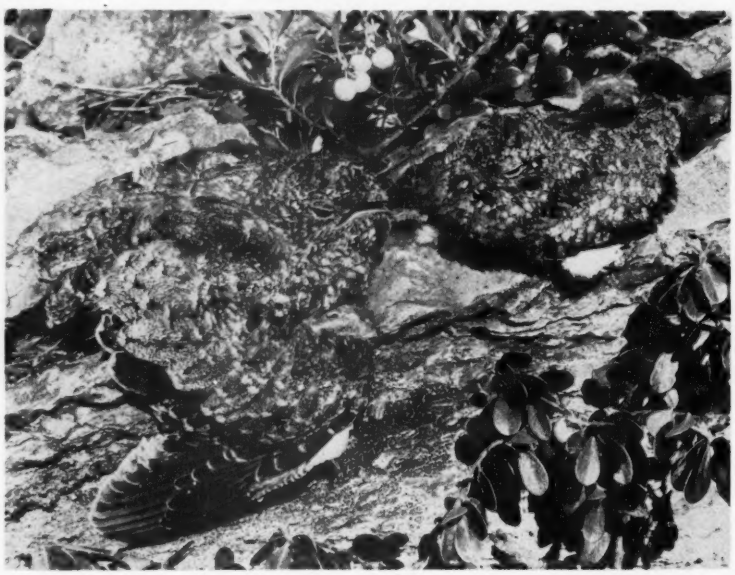
Leaf-tinted specialist of the dense undercanopy and high rustling crown of the wood, the warbling vireo (left) is seldom seen — the foliage keeps him hidden, a secret all its own. Yet, while ever busy checking the hordes of insect defoliaters, this little fellow in gray and olive green is never too busy to sing. Several thousand times a day in spring his airy rondo enlivens the glistening groves of aspen, birch or maple. And from his work he even takes the tinkling melody to his place upon their breeze-rocked cradle in the fork of a swaying branch when he relieves his mate.

Leafy depths of a red-osier dogwood were chosen by this shy olive-backed thrush for its nest. The bird is an abundant resident of mixed conifer and broadleaf woodlands and of fir forests, while its Pacific coast form, the russet-back, favors shady willow borders. Foraging upon the ground, as well as in the lower layers of the greenery, these thrushes are among the most efficient guardians of the wood. Their swirling cadences, enriched with golden overtones, mellow our summer evenings with haunting song.



The red-naped sapsucker represents a strange paradox — woodpecker turned flycatcher as well, and his insect-control measures are accomplished in an equally unusual manner. As a sideline to drinking the sweet sap set flowing by his treetrunk wells, Red-Nape catches the befuddled flies, moths, tree-hoppers, bark lice and ants that crowd about these breweries. His insect diet may amount to 69 percent of his total fare; while his bark-drilling is generally confined to those fast-growing, many-stemmed trees, the birches, willows and alders.

towhee, devour larval types that pupate in the soil and adults emerging to renew the insect life cycle. Flycatchers snap up winged insects everywhere in flight, from the low shrub layer of the woodland to the roof of the forest. Others, like the black-chinned hummingbird, take toll in more curious ways. This green and violet midget raids insects lurking in the throats of flowers, or joins that jolly toper, the sapsucker, at his sapwells, in preying upon tipsy gnats and flies. Avid eaters are the vireos, the gold-tinted warblers, and the midget, melodious kinglets.



Sweepers of the upper air, nighthawks perform invaluable service in checking enemies of the foliage. Their attack comes at the most vulnerable point of the insect life cycle — winged adults are comparatively few, having survived hazardous larval growth and metamorphism, and on their survival the future myriads depend. These two young Pacific nighthawks drowse away hot July days upon the sun-dappled, kinnikinnick carpeted floor of a yellow pine park. Soon a-wing, at dusk they will find the air above a nearby broadleaf wood teeming with flying prey.

Barro Colorado Island, showing the landing dock and the various buildings of the station.

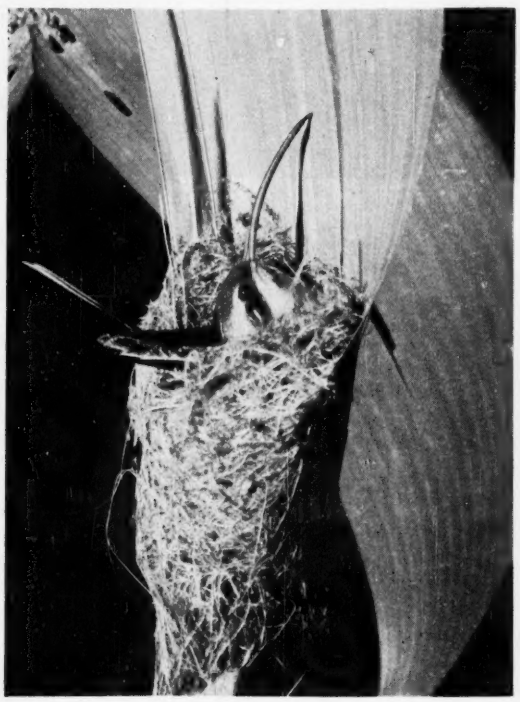
Tropical Island Laboratory

By LORUS J. and MARGERY J. MILNE

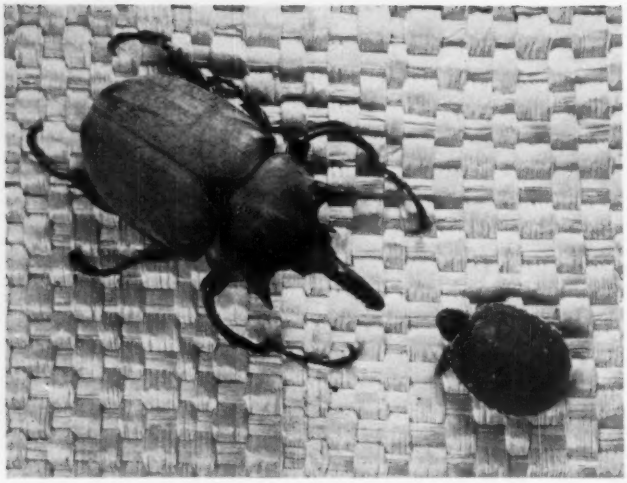
Photographs by the Authors

WITHIN the ten-mile width of the Panama Canal Zone lie the safest jungles in the world. Rigorous sanitation measures eliminated malaria and reduced yellow fever to a vanishing point, thereby making possible the engineering feat of the Canal itself. They also protect the many naturalists who journey to an important scientific laboratory operated by the Smithsonian Institution. This tropical laboratory is on an island in artificial

One of the largest of the Panamanian hummingbirds, the Nicaraguan hermit, on her nest, on the down-hanging tip of a small palm frond.



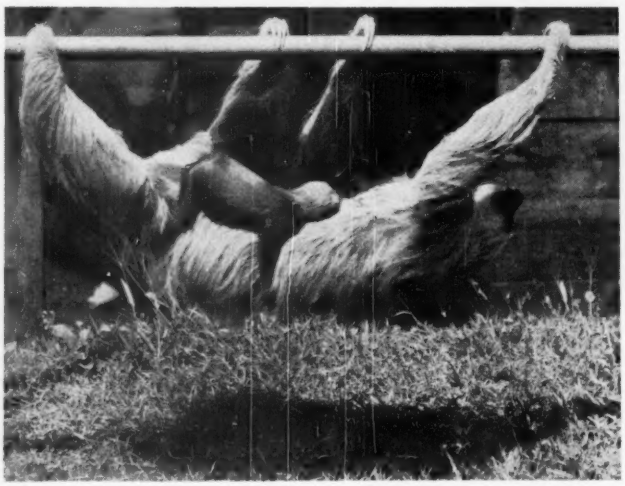
A green parrot resting on the branch of a tree on the island. In the early morning great flocks of these birds fill the sky, calling loudly.



A rhinoceros beetle and a young Panamanian turtle show relative proportions that seem entirely out of the ordinary.

Gatun Lake, high-level waterway of the Canal. The island takes its name — Barro Colorado — from the red clay soil covering its six square miles of area. It is a hilltop with an irregular coastline more than forty miles long, covered by a tangled jungle characteristic of low latitudes and high humidity. Since establishment of the laboratory in 1923, it has been a Mecca for biologists and for investigators interested in conditions within a rich, tropical rain forest.

Access to Barro Colorado Island is by way of a launch that meets the Panama Railroad Company train at the isolated station of Frijoloes on the rim of Gatun Lake. From a dock on Barro Colorado Island, the visitor must climb a straight stairway of 200 cement steps to pass maintenance buildings and reach the laboratory proper. This is a vantage point from which ships of all nations can be watched transiting the Canal, carrying cargoes and people between the Pacific and the Caribbean. White-tailed deer and those tropical relatives of the raccoon, the coatis, ramble through the clearing around the small buildings. Big green parrots flap overhead in noisy squawking pairs, while flocks of smaller paroquets wheel through the sky. Crow-sized toucans undulate like northern flickers to reach other parts of the forest, their huge, brightly colored bills outstretched. By night 300-pound tapirs feed along the shores, disturbing crocodiles and caimans. Pumas and ocelots pace



A two-toed sloth, with its youngster, demonstrates its upside down method of locomotion after being coaxed to the laboratory clearing.

silently along the trails in search of numerous but shy rabbit-like agoutis. Herds of wild pigs — both the collared and the white-lipped peccaries — root among fallen leaves and rotting trunks for insect grubs and worms, or browse on the lower foliage. Bands of black-pated, yellow-faced capuchin monkeys swarm through the trees, finding tender buds and edible insects at the ends of branches.

The correct name for the Barro Colorado Island sanctuary is the Canal Zone Biological Area. Its resident manager, James Zetek, is an authority on termites and their control. For many years now he has been experimenting with uniform samples of wood, treated with a wide variety of chemical

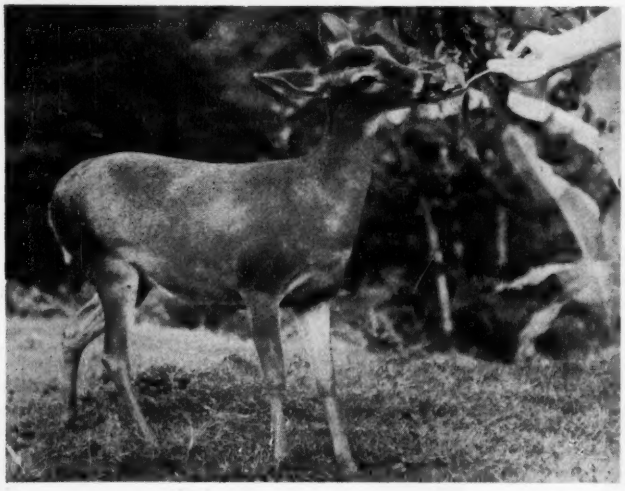
The coati, a relative of the raccoon, is among the most abundant of the larger mammals on the island.

A brand new laboratory building has provision for humidity control so that delicate scientific equipment and collections can be maintained in safety in tropical surroundings.

solutions, to learn which ones are most resistant to the dual devastations of termites and fungus rots. These studies are part of an International Termite Test program, with counterparts on a somewhat smaller scale in South Africa, Hawaii, and Australia. On Barro Colorado Island untreated wood samples (driven into the ground of the "termite cemetery") last, on an average, only eight months. In the experimental areas beyond the Americas the disintegration of corresponding samples requires 19, 21 and 28 months, partly because the relative humidity is lower and molds are less vigorous.

The combination of high humidity (80 to 100 percent of saturation) with high temperature (76 to 88 degrees F.) provides ideal living conditions for fungi and bacteria. So rapidly do these attack fallen leaves, toppled trunks and dead animals that the jungle floor is clean. Leaves fall constantly, and every hour the crash of a tree or giant limb can be heard in the jungle. But no leaf litter accumulates on the ground. On top of the reddish clay there is no humus layer. Organic disintegration proceeds too rapidly. Even the trunks of large trees — riddled by insects and fungi even before they fall — melt down and vanish completely within weeks or months.

During World War II the island was used by the armed forces as a site for the tests of anti-deterioration techniques and materials. Boxes intended for storage of equipment on exposed tropical beaches were studied in terms of insect resistance, duration of water-proof characteristics, and susceptibility to fungus decay. Field glasses and cameras were exposed to a wide variety of situations — even including burial in mud — to see which of the many trial models or internal treatments would be most effective in preventing entrance of molds, which grow on glass surfaces and etch lenses, making them useless. Methods for protecting metal parts from corrosion, cloth and plastic materials from disintegration, were followed with samples spread to the elements on Barro Colorado Island. Since 1941 the Eastman Kodak Company has been extending these investigations



The white-tailed deer are numerous and friendly. This one is being fed plum jam, which the authors joyfully shared after having eaten it for three months.

The termite testing region where wood is exposed to the environment after it has been treated with chemicals.

From the hilltop sanctuary one sees ships from all parts of the world passing through the canal.

The Holy Ghost Orchid blossoms in August and is the national flower of Panama.

in terms of photographic products of all kinds, in and around a termite-proof building erected for the purpose in the laboratory clearing.

During the past year, facilities for investigations on Barro Colorado Island have been extended through erection of a large new laboratory building in which it is possible to control humidity and temperature inside, and the completed building will house the instruments on which science depends. From within its walls naturalists will continue to emerge, both by night and day, to explore among the wealth of plants and animals protected for future study on Barro Colorado Island.

The jungle would be difficult to walk through were it not for the many trails laid out on the island. On the left is the spiny palm and lianas elsewhere give the rain forest its tropical makeup.

Recording the sounds of the tropical jungle requires elaborate portable equipment. Lorus Milne listens with earphones while adjusting the tripod-mounted sound-collecting horn to pick up a toucan's call.

The Broader View

ANNOUNCEMENT that the Third General Assembly of the International Union for the Protection of Nature is to be held in Caracas, Venezuela, from September 3 through 9, again focuses attention on the importance of the broader, international view with respect to natural resources. It was our privilege to attend the sessions of the Second General Assembly in Brussels in 1950, as well as the interim technical meetings held under the auspices of the Union at Lake Success, New York, in 1949.

Exposure to international gatherings of this sort is a salutary experience. It makes one realize that our local or national conservation problems are basically much like those of other nations; that abuse of natural resources in some far-distant region can have its repercussions right here at home. It is interesting to contrast the approach to conservation issues in older, more heavily developed countries with our own attitudes, and with those prevailing in countries still relatively undeveloped. One learns that individuals concerned about conservation and Nature protection, whatever their nationality, are superior people. They have the broader view.

When the International Union for the Protection of Nature was created in 1948 at Fontainbleau, France, there were some problems of semantics. One of these was the phrase "protection of Nature." Our word "conservation," which itself is susceptible of varying definition, had little or no meaning in other tongues. So "protection" was the chosen word, although in English it has somewhat of a connotation of locking up natural resources; preservation from use rather than wise use.

This is not the objective of the Union, except insofar as its aims include the preservation and increase of endangered species, or the setting aside of areas after the fashion of our own national parks. Otherwise, IUPN is devoted to the cause of wise use of natural resources for the benefit of the international community. It seeks to educate peoples to understand these resources; to learn to live with them without wasting them; and, especially, to learn to benefit by the experience of other peoples for the common good.

Whether a hydroelectric power dam is erected in Utah at the expense of a national monument, in Montana at the expense of the wildlife of a national park, in South America at the expense of other outstanding natural resource values, the problem and the challenge are similar. This is one of the subjects to be discussed at the coming Caracas meeting, underlining the importance of consideration of *all* values in justifying such developments. It is a question of reconciling the views of the engineer and the conservationists. Such questions are demanding answers, and without regard to geography.

Another subject that will come before the meeting in the Venezuelan capital concerns the preservation and restoration of wildlife resources in semi-arid areas of Central and South America. Also on the agenda is discussion of the situation surrounding both the flora and fauna of the Caribbean islands, with particular reference to the islands of the Netherlands Antilles, where a study of the little-known wildlife resources is under way.

Besides these subjects, the sessions in Caracas will also consider the various programs now being carried forward by IUPN, several of these with the collaboration of UNSECO. These include the work of the "Survival Service," not altogether a satisfactory name for the Union's efforts in behalf of thirteen species of birds and fourteen species of mammals listed as perilously near the point of extinction. Information as to the exact status of these species is being gathered and influence exerted, where possible, to assure protection, by law or through sanctuaries, for these birds and mammals.

During 1951, and with the cooperation of UNESCO, the Union brought out a report on the status of Nature Protection throughout the world. This was made up of reports from various countries, and, although a considerable volume, is regarded by the secretariat as merely a start. It is hoped that this report can be brought up to date and expanded, now that the pattern has been set for it. The Union's publication of the proceedings of the Lake Success sessions also provided an important document on international conservation.

In addition, IUPN has launched an educational campaign in several countries, supplying simple leaflets for teachers and pupils. These seem rather elementary when considered in the light of educational materials available in the United States, but they represent a start in countries where little or nothing has hitherto been done.

Today the International Union for the Protection of Nature is supported by five governments, which have ratified the constitution, by four international organizations and by 153 national organizations representing twenty-six countries. This is a splendid start toward the goal of wider international cooperation in meeting conservation problems on a world basis, and toward achieving a helpful interchange of ideas and action in the solution of these problems. The Venezuelan Government, the Venezuelan Society of Natural Sciences and the Union have joined in inviting official delegates, and any observers who may wish to be present, to join in the sessions of the Third General Assembly. Those who attend will have that important "broader view."

Beneath the sign describing Morning Glory Pool in Yellowstone National Park is the request, "Do Not Throw Objects in Pool." But here we have an example of vandalism that makes one wonder why people came to see this beauty spot.

Vandalism—Nature's No. 1 Enemy

By FRANK A. TINKER

RECENTLY, when it was proposed to give a site of rare desert growth in California the status of a National Monument, thus supposedly assuring it of protection from despoilers, residents who best loved the region offered firm objection. With publicity given to the place as a Monument, they argued, crowds of casual visitors would so increase that the few rangers available would be inadequate to control the public. Within a few years, the fragile bits of Nature that made the site notable would be badly damaged or destroyed by flagrant vandalism. Would it not be better, friends of the area asked, to let it remain relatively unknown, and thus be assured that those who sought it out would do so from a sincere interest rather than curiosity?

Today only remnants of our native wilderness remain in complete protection, for the most part under a National Park Service sadly limited in personnel and funds. Even these few vestiges of the original America are under constant attack by selfish interests seeking to convert this public property into private dollars. Added to these threats is the shame of vandalism by the very Americans who jointly own these areas and who are themselves the worst enemies of these irreplaceable material and spiritual assets.

Not one of the lovely thermal springs or pools in Yellowstone National Park is left unmarred by thoughtless vandals. Hankerchief Pool was completely ruined by refuse-throwers and souvenir hunters. In Shenandoah National Park, trees are chopped, initialed, and stripped. Many of the old Spanish missions of the Southwest are now gone completely, literally torn to pieces and dug under by seekers of rumored treasure. The list is long and sad.

Why should we let this be done to parts of America that most truly belong to all of us? What is the strange quirk that makes us do this to ourselves?

Some of the reasons, of course, are as obvious as they are inexcusable. Treasure hunters have been among the worst of the spoilers. In Bear Mountain Park, near New York, a series of heavy explosions came from

The inscriptionists and date-writers have little sense of propriety or beauty. These are scratched in the delicately colored mineral deposits on the bottom of Yellowstone's pools.

atop a forested peak. Several aged refugees from Brooklyn flophouses, who had found a cache of dynamite, and a pathetically fraudulent "treasure" map, had set up a base camp in the pines. They were preparing to blast through several thousand feet of solid rock for "treasure," without considering how the original owners of the treasure had been able to bury it so deeply.

This was an isolated and absurd instance, but gold vandals of the Southwest were not. Spurred by tales of buried chalices and church treasure, they despoiled missions, melting one of the most significant physical links western America possessed with the memorable past in a blind crucible of greed.

Collectors, although professing a pseudo-scientific intent, are too often little more mindful than the treasure seekers of the damage they cause in obtaining their trivia. Unless such persons can prove the future scientific or research value of their efforts, and can operate without harm to the site they are investigating, they must be classed with the souvenir hunters. The ancient dwellings of the vanished peoples of the Southwest, the Ho-ho-kam, were toppled from their magnificent cliff settings into a dusty oblivion below so that a pathetic scrap of cloth or artifact might be found beneath the walls. Places like Betatakin, Tonto, Casa Grande, and Tuzigoot all suffered this contemptible treatment until they were finally set aside as National Monuments, which forestalled at least the avowedly destructive element. Rangers still must guard, however, against the surreptitious removal of adobe bricks, or the inquisitive push that may tumble a centuries-old wall.

There is some motive behind these destructive acts,

Any of the beautiful thermal pools in Yellowstone yield such a mess after a heavy tourist influx. Eventually they may be entirely ruined by an accumulation of such trash.

A student points out some of the defacements of the Indian picture rocks at Tucson, Arizona.

but more inexplicable, and much more widespread, is the absolutely illogical, jejune destruction and defacement of Nature's beauty in any form. Thus park authorities must face the fact that the vandal may strike anywhere, any time, with no hope of gain beyond dubious satisfaction from a malicious deed.

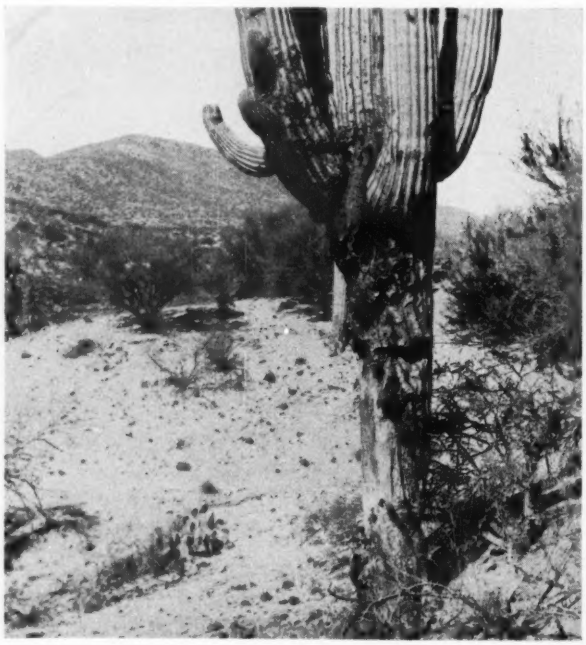
Moreover, it is difficult to tell just who may be the prospective offender. A director of the Nature trails at Bear Mountain had spent several seasons of hard work and constant care developing a collection of hardy, gorgeous orchids. Imagine his amazement and despair when a well-dressed lady, who had been chauffered to the park in a limousine, met him on the trail with a blithe smile and an armful of the carefully labelled blossoms, ripped from their growing places. "I hope you don't mind my taking these few wildflowers," she said.

The director took little pleasure in knowing that the lady, despite her protests of "knowing somebody," was severely fined. This neither replaced the orchids nor gave assurance that the person would do differently at the next opportunity.

Among the various classes of offenders, sadly, the 'teen-agers are by far the worst and most constant. This applies even to those groups ostensibly dedicated to a program of outdoor education and better citizenship. A park supervisor in California writes: ". . . To those who appreciate the beauty and uniqueness (of the parks), it causes a chill to see Boy Scout and FFA groups enter. . . . In most cases, regardless of organization, the boys break into small packs and roam unescorted over the formations. Their malpractices are very much in evidence after their departure."

Certainly this presents an outstanding challenge to such organizations. Can it be that 'teen-agers have been pampered to the point where their responsibilities are no longer clear to them? Are they unaware that they possess a hard-won, personally valuable heritage? It was a 'teen-ager's initials that were deeply cut into the bark of a giant Yosemite redwood. They were youthful scrawls and dedications scratched into the Newspaper Rock, in Petrified Forest, obliterating or confounding the old Indian drawings there. Young campers in Arizona used the shag tops of park shelters for firewood; in Grand Teton they tore up amphitheater seats for the same purpose.

To such vandals, it does not seem apparent that the damage they do to natural features is irreparable. The attitude is that, since the parks and monuments are



The results of thoughtless action. This huge saguaro cactus, perhaps well over a century old, has been destroyed in a few years by rotting caused when its main bole was hacked and punctured needlessly.

public property, they may be treated far differently than one would allow people to treat one's own lawn. Each year hundreds of bottles, cans, rocks, and other debris are tossed into the great geysers at Yellowstone, as well as into the surrounding springs and pools. Some of the drains have already been clogged with these items, and in time the great vents and blowholes will also be closed and dormant.

Nature takes ages to create displays that can be destroyed almost in a moment by thoughtless fools. Ancient civilizations will not return to repair the few relics they have left.

Often acts of vandalism show a remarkable perseverance and tenacity. It appears sometimes that the people who perpetrate the follies have more energy and determination than those who must prevent them. J.M. and H.B., who hammered their initials into the Indian Picture Rocks at Tucson went to great trouble, as did the vandals who descended all the way into the Grand Canyon to smash a glass exhibit case — which had been carried there on the backs of men, being too large and fragile for mule transport — and made off with the exhibit itself.

Who are the people, you ask, who must meet and thwart these atrocities against Nature, the nation and fellow citizens? It is simple and clear. They are you, your neighbor, and me.

The National Park Service simply does not have the funds or personnel adequately to police areas under its jurisdiction. Indeed, 100 percent protection for the parks would almost require a guard for each visitor. Of course, each visitor himself could become a guard, and he should, for these areas are *his* areas. He has set them aside for himself and his descendants, for his neighbor and his children. Each park visitor should be a volunteer ranger to guard against vandalism.

Some rangers must work six or seven days a week for five days' pay, or no protection could be guaranteed their areas. The Director of the Park Service reported that rangers were cleaning washrooms in the Petrified Forest, and directing traffic in Muir Woods, while visitors roamed largely unguided and unrestrained. The jobs immediately at hand had to be done, if only from the standpoint of sanitation and safety.

Usually rangers and other personnel in the Parks and Monuments are patient and even-tempered. Each Monday, and at the end of each season, they stoically sweep cans and papers from the woods, seine rocks and bottles from the pools, repair the broken windows and signs, and clean out those trees that have been irreparably damaged by whittlers and firewood-seekers. The thought must occur to them at such times, as it does to others, "Why bother?" Why try to maintain these oases of beauty in face of the indifferent urge to destroy?

Once in a while, much less often than justified, park men are driven to the breaking point by some inexcusable folly. There was the case in an eastern trailside museum where a man had been patiently, dumbly sharpening a stick. Suddenly and without warning, he shoved the pointed end through the bars of a cage and impaled a woodchuck housed there. Luckily, several members of the staff happened to be in the vicinity and managed to pull the enraged attendant on duty off the miscreant before serious harm was done. For this, instead of receiving a citation for normalcy, the attendant had to be reprimanded and fined.

The cost of vandalism in our park areas is hard to estimate, and it seems pointless to try to do so in dollars and cents. For one thing, it must include all the police protection given to such areas, protection against damage and to maintain the general peace. How meaningless it would be to translate the value of a forest lost through a vandal's fire into terms of the dollar cost of its board feet! What is the life of a woodchuck worth in pennies? Rather, the damage must be reckoned in units of beauty lost, whatever they are; a heritage forsaken; a shame acquired.

The problem might seem hopeless, since we are dealing with an unexplainable quirk of human nature, were it not for the essential goodness of that nature itself. There are artificial means to prevent this wastage, of course, but for the most part they are only stopgaps and temporary deterrents. Visits to park areas could be limited, which would defeat the very purpose of these reservations. The public could be barred from certain places close to the more fragile displays; again a totalitarian measure. No fires or picnics might be allowed in National Parks. Beer might be required to be sold in bottles with a heavy deposit fee, instead of in cans, which have become anathema to attendants who must serve on cleaning details and fish cans out of lakes, shrubbery, and restrooms. Charcoal might be sold to discourage the use of dry wood, which flames and sparks. Some of these measures are next to impossible to enforce, some are disagreeable, and none of them would have a decisive effect on vandalism.

The one thing that will put an end to this smear on the national record is education in outdoor good manners, backed by constant vigilance. We return to the important quotient in the problem — ourselves. It is only through the inculcation in ourselves, our families, our youth groups, our civic organizations and our acquaintances of an appreciation for things natural, historic, and beautiful, things that add to the esthetic total of the countryside and the spiritual enjoyment of the individual, that the goal will finally be approached.

There are many ways in which this can be done, and, hearteningly, many ways in which it is being done. One of the best methods of finding the value of any article is in working for it. People in every area nearby a site of Nature's fine handiwork, whether it is under formal protection or not, are finding renewed appreciation for their surroundings by contributing to its protection and upkeep. For a time, after the war, it seemed that, with the rising tide of visitors engulfing the parks, the situation was becoming hopeless. In the last few years, however, there has been a distinctly encouraging trend, by no means eliminating (Continued on page 332)

Ellsworth Lumley:

Gentle Crusader

By IRVING PETITE

MODERN American society makes such complex demands upon the individual that few persons can afford whole-hearted devotion to a cause, and now, more than in Thoreau's time, "most men lead lives of quiet desperation." Those who are Whole Men, wherever they live, stand forth as monuments to what we all might be.

Such a man was Ellsworth D. Lumley. Wherever his work took him — as park naturalist, teacher, or leader in local and national conservation crusades — his purpose was clear; his dedication apparent, even to those who most heatedly opposed him.

"He felt he had a mission," Marion Lumley explains. "And there were many times when, from the way he worked, it was as if he knew that his time was running out. He used to get impatient with me for asking him to 'slow down'." It was as if he could see ahead to the cerebral hemorrhage from which he died on February 10, 1950, shortly after his 47th birthday.

Born January 11, 1903, at Bear Lake, Michigan, Ellsworth Lumley went with his parents to Marysville, Washington, in 1906. His father worked in the mill of the Crown Lumber Company in Everett, and his mother taught fifth grade at Marysville.

Early in life El was, as are many children until the hardening experiences of age divert them, a fond observer of birds and other animals. Fortunately, this bent was fired by Charles Bowman Hutchins, early Northwest naturalist, artist, poet and singer of bird songs. While still attending grade school in Everett, Lumley was encouraged by his Aunt Neila to see an entertainment by Mr. Hutchins. He became acquainted with the naturalist, and became inspired, in his lifelong enthusiasm for wildlife, with a special love for birds. He studied bird-whistling under the naturalist and learned to imitate bird calls; and Mr. Hutchins is reported to have said: "Many boys say they want to copy the bird calls. He's the only one who really carried it through."

After graduation from Everett High School in 1922, Lumley attended the State College of Washington for a year, then the Western Washington Normal School at Bellingham, where he took bird-art work and received the two-year teaching diploma in 1924. He earned his board and room in the household of President Charles Fisher, where he was encouraged in his love of natural science.

Young Lumley taught grade school at Willapa, Washington, for two years, and spent the following three years at the University of Washington, where he received a BS in education in 1929. He partially earned his way at the University by giving lectures enlivened by "chalk-talk" drawings and whistled imitations of bird songs.

Ellsworth D. Lumley and a tiny bit of his moth and butterfly collection, in connection with which he corresponded with and traded specimens with collectors all over the world.

Evident in his early years were El's enduring patience and singleness of purpose. At the University of Washington he studied with Dr. Robert C. Miller, under whose guidance he began a study of the "Factors Affecting the Morning Awakening of Birds." When he left the University, he went to Great Falls, Montana, to teach biology, and there continued his study of the morning awakening factors. This study involved several years' work, and for part of the period he filled a notebook with observations in a field that would have stumped a less-determined student. He arose each morning in all weathers and was in the field in time to record, the minute he could see "the face of the watch," the behavior of birds.

It was during the period of this study that he met and courted Marion Strauss, another Great Falls teacher. They were married in 1930. Looking back on a married life that she shared with crippled robins, pet bull snakes and Gila monsters, orphan squirrels and

homeless owls, she says: "I walked thousands of miles to catch him," for she had accompanied Ellsworth on many of his studies in the field.

Great Falls students profited from Lumley's enthusiasm when he formed a High School Audubon Club. In 1931, the Club published a "Check-List of Great Falls Birds," and in 1934 El made his course in advanced biology a class in bird-study.

Students there, and at Seattle high schools where he taught zoology from 1937 on, felt the impact of his zeal, and transplanted into their own feelings his convictions about the needs for wildlife protection. "He had a way with people," Marion Lumley says. "He could get them to do things." He convinced his students by practical experiments and observations, not just by arguments. To show them that hawks are mostly beneficial, he had them dissect the stomachs of hawks and count the numbers of grasshoppers, mice, weed seeds and other foods contained there. "He said, 'It's like mathematics that way — like proving a theorem'," Marion Lumley recollects. She adds that: "Teachers *can* mold their students' lives", and it is certain that Lumley did so.

Professor Melville Hatch of the University of Washington wrote recently, in his "*Ellsworth D. Lumley: In Memoriam*," that: "Lumley's classroom became a pulpit from which he preached early and late the love of man's fellow creatures, and the writer can testify from his personal experience with Lumley's former students as to the lasting impression that he made."

The best kind of teacher, Ellsworth was continually himself a *learner* in his chosen fields. He joined the Pacific Northwest Bird and Mammal Society in 1929 and was elected its secretary in 1937. He became a member of the Cooper Ornithological Club and the American Ornithologists' Union. During the summers of 1933, '34 and '35 he studied with Dr. Miller at the University of Washington's Oceanographic Laboratories at Friday Harbor on San Juan Island. With Dr. Miller he prepared a study of the birds of the San Juans. This was published with an introduction by F.S. Hall.

At the same time Lumley was making numerous written contributions, especially in the field of bird lore, in scientific publications. Among his first articles were "Notes on the Snowy Owl in Montana" (*Murrelet* XII, 1931), and a series including "Hawks," "Eagles" and "Owls" published under the auspices of the Emergency Conservation Committee, of which he was Secretary. These pamphlets were made available to high schools throughout the country. The quiet teacher's voice was heard from far and near, and one response, dated June 30, 1939, follows:

My dear Mr. Lumley:

I am very glad to have a copy of the new pamphlet on eagles which is being published as a part of the Conservation series of the Emergency Conservation Committee.

The pamphlet contains much interesting and constructive information on these birds and should be widely disseminated in order to assist in their preservation in America. I share with you the wish to see these birds adequately protected by law.

Very sincerely yours,
(signed) Franklin D. Roosevelt

The Ellsworth Lumleys and their sons, Donald, left, and Arthur. This picture was taken shortly before the first fall field trip of the Seattle Audubon Society in 1949.

"The Value of Teaching Conservation" was El's original contribution to *Nature Magazine* (XXVII, 1936), followed in this magazine's pages by such subjects as "The Plight of the Sea Birds of the San Juan Islands," "The Crow as a 'Villain'," "The Great Blue Heron," "Falconry," "The Hunter vs. the Sentimentalist," and many more.

Some of the titles will point up Lumley's continuing war on the bounty system, which is now widely recognized as an unsatisfactory method of predator control. He insisted that all attacks on "predators" be based on facts; that the whole case against a bird or mammal should be summed up and evaluated before the animal was condemned. He became well known to the readers of Seattle newspapers by virtue of numerous interviews and letters, mostly concerning the conservation of various animals; he even won the grudging admiration of "sportsmen," with whom he debated in their own columns.

Lumley's battles in such matters were not confined to the Northwest. He was a park naturalist at Rainier National Park for seven summers preceding the out-

break of World War II, and through this work and his general interests he became concerned with the battle to create and maintain the Olympic National Park as one of our last wilderness areas.

In the spring of 1938 he spoke in several eastern cities and in Washington, D.C., where he also urged before Secretary of Interior Harold Ickes the expanded boundaries of the Olympic National Park. His expenses were partially defrayed, according to Marion Lumley, by Mrs. Bowles of Cleveland, who sponsored his lectures in that city and who, with her husband, Major Bowles, owner of the *Cleveland Plain Dealer*, had made Lumley's acquaintance at Rainier.

Following his lectures in other cities, Ellsworth was sponsored in appearances in New York City by Mrs. Rosalie Edge, his long-time friend and chairman of the Emergency Conservation Committee. His speech before the D.A.R. convention followed that of Washington State's governor Martin, who championed the interests of the lumbermen; and it was Lumley's speech that swung the D.A.R. support to formation of the Olympic Park, according to his wife. Passage of a bill for the Park's formation occurred in 1938.

Recollection of those days reminds Marion Lumley of her husband's response to their pastor's enjoinder that he do more church work. "I'm the only one who'll save the wildlife," Lumley told the minister. "There are plenty working to save humans."

"He was completely unafraid, and eternally an exponent of fair play," says his friend Harry W. Higman, who also speaks of him as being "constantly keyed-up . . .unable to relax," and adds: "He was a man of immense courage and was absolutely fearless in his defense of any phase of nature that he thought needed defending. He inaugurated, singlehandedly, half a dozen Northwest or national campaigns and fought the through, some to an extremely successful finish and others to what might be called a successful compromise, but which to him almost spelled failure. For, to him, anything short of the proper victory was unsatisfactory."

Among battles described by Mr. Higman was the successful endeavor of 1949 to keep the gentle mourning dove off the shooting list in Washington State, and the continuing fight against the opening of a season on mountain goats by the game department of his State.

Although Lumley often waged what would seem to be a solitary and uphill battle, he was not without recognition, and even on an international level his ideas spread and were accepted. His article "World Tours for a Few Dollars," which concerned animals pictured on stamps and first appeared in the April, 1947, issue of *Nature Magazine*, was reprinted in *India's Stamp Journal*, and a part of the comment of the editor of that *Journal* was: "We genuinely wish India had the good fortune to possess half a dozen educationalists like Mr. Lumley."

Thus was a quiet teacher with deep convictions able to make his voice heard, and the value of his teaching is as uncountable as waves spreading outward from a stone thrown into a lake. Besides defending animals and American wilderness areas, he did more than most men can to pass the torch to others. His home was host to legions of friends and to youths he had inspired, several of whom are now high school or university teachers themselves. Many students stayed with the Lumleys for varying lengths of time while attending the University of Washington. His aid to others was not only of the spirit but also — and this is the greatest gift from a family man on a teacher's salary — of the pocketbook.

In 1947, Ellsworth conducted the first civilian tour over the Alaska Highway from the United States to Anchorage and Fairbanks. He was so well liked personally and as a leader, that about half of the 25 persons who took the trip later visited him and Mrs. Lumley in Seattle.

Whatever Lumley did in the field of conservation, never seemed "enough," to him, and he was constantly striving to increase his results. Just before the stroke that caused his death, he had been taking a night course in article writing at the University, and the night preceding his stroke he had attended class. Not content to be a writer of many published articles, as well as of courses of study and scientific treatises, he meant further to improve his communications with others in the field of his lifelong interests.

His last article was about an orphan squirrel he had befriended, and was entitled "Frisky the Missionary." Certainly Ellsworth D. Lumley was himself a wholehearted missionary, one of the most loved and respected in the West, and making his gentle will widely felt.

★

Water Songs

By LALIA MITCHELL THORNTON

The sea shell has its song, the tides, the surf,
The little waves that lap against the sand;
Silence belongs to deserts and to turf;
There is no constant music of the land.
And I who love the things that serve my ear
Am happiest when there are waters near.

A Flood-Scoured Island

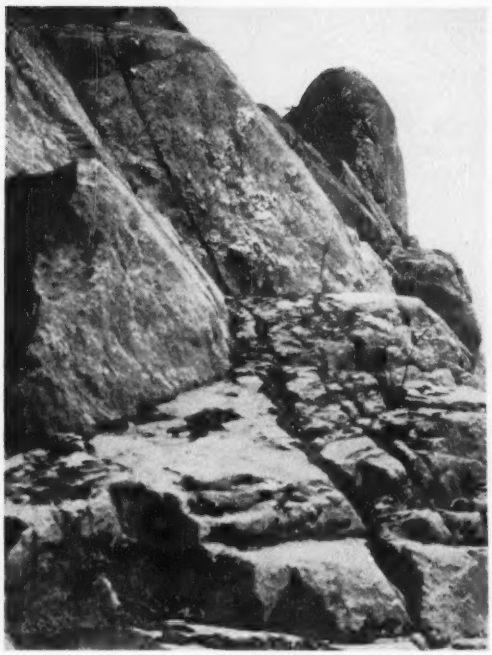
By W. L. McATEE

MODERATE freshets, by dropping part of their silty burden, add to islands, but raging floods may take most of the soil away. Observed subjects of this process were the Three Sisters, farthest downstream rocks emerging from the Potomac River at what was its ancient mouth. These islets, not far above the bridge at Georgetown, D. C., when I first saw them in 1903, were well separated and had little vegetation. Year by year, however, mud was deposited about them until at low water they were joined and bore much shrubbery and even trees. Then came the exceptional flood of 1936 — a mighty current that removed the soil and all it supported and left the Three Sisters as distinct and rocky as they were before.

Such being the work of the swollen river at a place where there is little gradient, how much greater must be the scouring effect on an island just below the Great Falls of the Potomac. There a drop of nearly a hundred feet in a mile adds immeasurably to the turbulent power of the waters, which, it would seem, nothing could resist. But, taking the full force of the Potomac, always swift and sometimes racing, at the very foot of the Falls, and what is more, where the main stream changes direction, stands the island about which I wish to tell you.

Only a durably rock-bound channel could have confined the Great Falls through the ages, and, even so, the holding has been but relative. The river has worn down the rocks, hard though they are, and has switched its bed, several old runways being traceable. The rocks are of the granitic type, but being more or less stratified come under the definition of gneiss. The seams between the layers run from northeast to southwest, thus paralleling the Appalachian Ridges of which they are among the easternmost visible outliers. The stratification evidently has provided the river many opportunities for gouging out weaker elements, and the effect has been so pronounced on the island of which I write that it is traversed by four major clefts, one almost severing it; hence my name of Cleft Island.

The rockbound channel and the swirling water below the falls. Such water scours the rocky island.



A scene that might be in the mountains but is actually on Cleft Island, below the Great Falls of the Potomac in Maryland.

Conceivably the clefts may have been rapidly made, great sections of rock being torn away when the seams became sufficiently loosened. They are more or less angulate, corresponding to the dip or tilting of the rock strata, and their surfaces are rugged. Other water work of a scouring type has produced smoothed floors, walls, and domes, as well as the interesting ground-out potholes.

Now potholes on Cleft Island, some of them on the very top, are manifestly venerable, for they were made when the bottom of the River was about 75 feet above its present-day normal surface level. Potholes are worn by stones in swirling currents and may be from inches to several feet in both depth and diameter. Some of those on Cleft Island, with the grinding rocks still in them, are veritable fossils — relics of a past we hesitate to say how ancient. In one instance, a larger and a smaller pothole had been worn until the wall between them was perforated; except for their difference in size these might be called twins. Others had been split by

the clefts, presenting good vertical sections, and one was in a rock that had been worn or weathered down on all sides until only a part of the bottom remained, forming a giant wash-bowl in which rain-water often was standing.

Floods are an old story to Cleft Island; every year they rush over most of its surface, and at the very highest stages entirely cover it. This occurred in 1889, I assume, from the evidence of logs stranded on its summit. Out of contact with soil and lying on rocks fully exposed to the sun, these logs had decomposed slowly and there seems no doubt that for forty years they had been in the site where photographed. (If still there, the period would now be sixty years.) In view of progressive, if slow, cutting down of the river channel, it may be that the site of these old relics will never be reached by another flood. That of 1889, it is interesting to note, was referred to by old-timers along the Chesapeake and Ohio Canal as the "Johnstown Flood," although that mighty destroyer was in a different drainage system, namely of the Ohio River.

(Left) Logs on the summit of Cleft Island, the largest log eighteen inches by forty feet. The log has probably been there since 1889. (Below) The remains of a large pothole about twelve feet in diameter.

Cleft Island was accessible by stepping-stones at low water stages, mostly in late summer and fall; I was able to get on it in spring during only one year — the very dry one of 1930. The incentive to explore the island was to learn whether animals ventured there, and what plants could gain and keep a foothold on a place so often and so thoroughly flooded and scoured.

From sign, I learned that cottontail rabbits sometimes came, and I saw buzzard preenings on the summit and crow tracks on a sandy beach. Song sparrows and probably other small birds were transient, but the Island would be a fatal place for them to nest as it was usually flooded in May and June. A colony of burrowing bees was found in the sandy soil of the cedar pothole illustrated, and old nests of mud-daubers were plastered on the walls of other potholes. Galls on hackberry and goldenrod testified to the presence of insect parasites of those plants. Dragonflies visited the permanent tarn. Doubtless many other insects flew, or were blown, onto the Island, and in favorable seasons short-lived species may have bred there. On the whole, however, Cleft Island was an inhospitable place for animals. Consequently it must be presumed that certain plants, the seeds of which are supposed to be distributed mainly by animals, as Spanish-needles, beggar-lice, and cockleburs, were brought here by water.

Turning now to the plants, I may say that lichens, liverworts, and mosses — pioneers where there is little or no soil — were well represented on Cleft Island, but "they were Greek to me." The higher plants, which I knew better, all required more or less soil, but soil nowhere could be exposed to more destructive erosion than on Cleft Island. Its only safe haven in the zone of annual flooding would seem to be deep rock crevices. In places rarely submerged, soil could accumulate and would be more or less bound by the roots of vegetation. Strongly rooted plants, as the sweet flag and waterlilies, may have clung to rocky footholds in the bottom of pools, although most or all of the surrounding soil was periodically carried away, and survived on their own stored nutriment that would be rebuilt from new increments of mud. It was tempting to believe that the soil in general was annually renewed by deposition of sediment, as the floods receded, in crevices, potholes, and landlocked pools, and finally amid shingle and on the beaches.

In a negative way, the flora of Cleft Island was most strongly characterized by the absence of humus-loving plants, including such familiar spring flowers as dog-tooth violets, spring beauty, bloodroot, Dutchman's

breeches, rue anemone, May-apple, and associates. This is readily understood by anyone who saw the effects of the great 1936 flood on Plummers Island, four miles downstream, where on low-lying parts of the island, the humus and all it contained was lifted up and swept away, clear down to the barren hardpan. On Cleft Island the story would be worse, as rock, not even hardpan, which still is a kind of soil, would be the base after denudation.

Although floods are ruthless robbers of soil and vegetation, they are also generous bearers of silt and seed. Seeds of scores of plants are borne by freshets in quantities beyond computation. We see them abundantly in piles of drift along the shore and it is certain that as the waters subside, every niche, which retains some soil, is reseeded and has a chance to support greenery.

The most obvious evidence of the seeding of Cleft Island by floods was the presence, on sandy beaches and in mud among the lower rocks, of waif cultivated plants. Corn, pumpkin, and tomato were among them; one of the latter in November bore a fruit four inches in diameter. In the sand and shingle, stray farm weeds also were most likely to occur, as ragweed, cocklebur, plantain, and mullein. The very hazards of these places, resulting in the elimination of hopeful pioneers, also made space in which successors could settle — a process of alternating hospitality and eviction that is highly characteristic of such an environment as Cleft Island.

The general aspect of the vegetation contrasted with that of nearby shores in sparsity due to more rock and less soil, and within that sparseness in the dominance of scrub pine and red cedar — trees well-known to be tolerant of poor sites. In winter, oaks retaining many brown leaves were conspicuous on the ridges, as were the coppery tufts of broom sedge and Indian grass in clefts and crevices. Other growths that were plentiful enough to be readily noted, included, among woody kinds, hickories, black locust, smooth sumac, poison ivy, red maple, Virginia creeper, shrubby St. John's wort, flowering dogwood, blueberries, white ash, fringe tree, trumpet-creeper, and arrow-woods; and, of herbs, grasses, alum-root, wild indigo, Bouncing Betty, flowering spurge, goldenrods, and asters.

Among special habitats on the island, crevices and cracks in the gneiss were common. They varied in size from those holding a mere pinch of soil with a bit of moss to others supporting shrubs and trees, although dwarfed in these ill-provided rootholds. Thus a thorn-apple, certainly mature as it was full of fruit, was not more than eighteen inches tall, and lovely asters, common in the rock crevices, often had both flowers and seeds when only two inches high. Beautiful blossoms were characteristic of the crevice plants, among them the violet-flowered aster just mentioned, its cousin, the purple daisy, two species of goldenrod, a yellow-flowered ragwort, the white twin-flowering partridge-berry, the moss pink, and the red columbine. Although the offspring of apparent adversity, they were lovely.

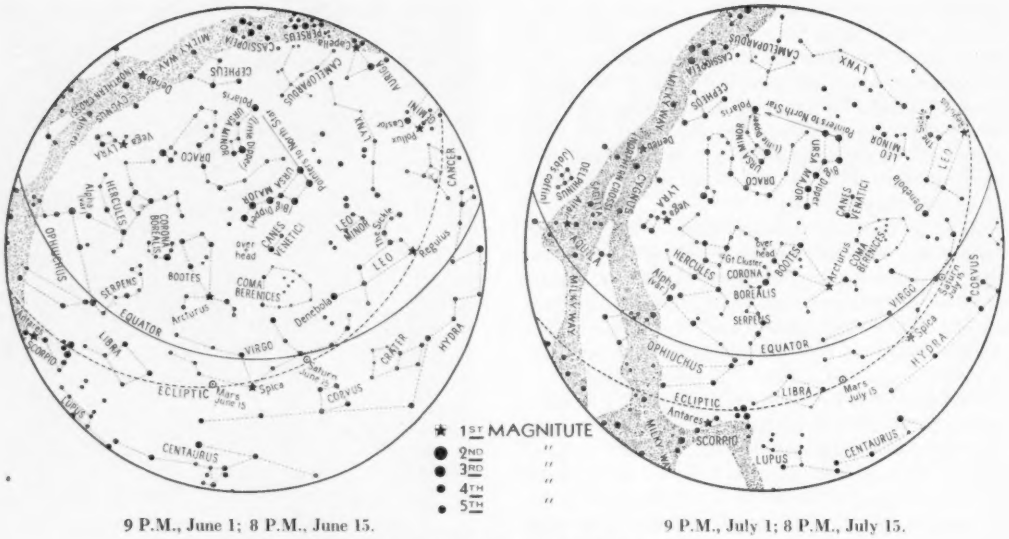
So like a mountain, Cleft Island appropriately had a

The Wash Bowl, a pothole the walls of which have been worn away.

tarn, which, though certainly scoured out every year, sheltered a number of water- and mud-loving plants. Some of these also spread gorgeous blooms, as the yellow and the white waterlilies and the rose mallow. Great fertility was shown here by a fruiting stalk of water-plantain that was four and a half feet tall. A colony of plantain that was four and a half feet tall.

Interesting as the potholes were, they could hardly be considered as a type of environment because they varied so greatly among themselves. However, they offered shelter — the prime need on this flood-swept rockery — and always rewarded examination. The "big pothole," a twelve-footer, contained one or more plants of each of the following species: Gama grass, hackberry, Bouncing Betty, dwarf thorn, wild indigo, white sweet-clover, yellow wood-sorrel, northern passion-flower, blue waxweed, and two morning-glories.

Part of the fun of studying an island is that the objective is restricted; things are either on or off — definitely. There is also a game of numbers; how many of this and that can we find on our naturally fenced domain? At the time the notes here summarized were made, the recorded flora of higher plants of the District of Columbia region included some sixteen hundred species. On Cleft Island nearly two hundred and fifty kinds — about sixteen percent, or a sixth of that total — were found. Considering that the island is entitled only to piedmont plants (not those of the coastal plain — a great element in the regional flora), that it is practically a great rock with little diversity of habitat, and that it is intensively scoured by annual floods and periodical super-floods, the evidence that so many plants have the hardihood and tenacity to maintain, or constantly replace, themselves there, is amazing.



9 P.M., June 1; 8 P.M., June 15.

9 P.M., July 1; 8 P.M., July 15.

To use these maps hold them before you in a vertical position and turn until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south. Times given are Eastern Standard.

The Evening Sky in June and July

By ISABEL M. LEWIS

USERS of the sky maps for the summer months should bear in mind that the times for which they are prepared are Standard Time and not Daylight Saving Time. So add one hour to the times given below each map if one is keeping Daylight Saving Time.

At the times of the evening given one finds that the Milky Way is very inconspicuous in the early summer. In June the portion that arched so magnificiently across the heavens through the constellations of Cassiopeia, Perseus, Auriga, across the feet of Gemini, and through Monoceros to the southern horizon, in winter has completely disappeared below the western horizon. On the far northern horizon, and directly above it, may be seen only the region that lies in Perseus and Cassiopeia. Now the branch of the Milky Way, or Galaxy, that is brilliantly to adorn the evening skies in late summer and fall lies in part along the northeastern and eastern horizon. By the middle of July, at nine o'clock in the evening, Daylight Time, it is well in view in the eastern half of the sky, dividing into two branches in the Northern Cross in Cygnus, to meet again in Scorpio and Sagittarius.

The most brilliant and most extensive portions of the Galaxy are those of the southern hemisphere below the horizon in the mid-latitudes of the northern hemisphere. Particularly beautiful and complex in structure is the portion of the Milky Way in the constellations of Sagittarius and Scorpio and in Centaurus and Crux, The Southern Cross. It is in that huge constellation of Argo Navis of the southern hemisphere that has been broken up into Vela, Puppis, Carina and Malus, that the portion passing through the winter evening skies to the southern horizon meets that which passes through our summer evening skies into Centaurus, and Crux.

In the evening skies in June, and also in July, one may see that part of the heavens that lies farthest north of the Milky Way or Galaxy. It is the region of the north pole of the Galaxy, which is in the constellation of Coma Berenices. The south pole of the Galaxy is in Sculptor, a constellation directly south of Cetus. The Galaxy itself crosses the celestial equator in the constellation of Aquila, and also at a point just east of Orion. It comes nearest to the North Pole of the heavens in Cassiopeia and nearest the South Pole near the Southern Cross, or Crux.

In Coma Berenices, and in the neighboring constellation of Virgo, directly above the huge Y-shaped configuration that is so characteristic of that constellation, lies one of the most remarkable areas in the heavens. In this are two great clusters — the Coma cluster and the Virgo cluster — of extra-galactic nebulas most of which are systems of stars similar in structure to our own spiral-formed galactic system. The Virgo cluster

covers an area of about ten square degrees, and, although it is the nearest known cluster of such systems, it is at a distance of 7 million light years. It consists of several hundred individual nebulas, all receding from the earth at a velocity of around 800 miles per second. The Coma cluster has about 800 members, It is about 3 degrees from the north pole of the Galaxy. Its distance from us is about 46 million light years, and it is receding at a speed of about 4600 miles a second.

There are in the heavens a number of such clusters of extra-galactic nebulas, all very faint objects at distances of millions of light years, visible only in the most powerful telescopes and all receding from the Galaxy at high velocities. In that beautiful, little constellation of Corona Borealis, the Northern Crown, visible now in the evening sky, not far to the east of Coma and Virgo, is the Corona Borealis cluster, consisting of about 400 members, mostly elliptical nebulas crowded into an area about equal to that covered by the full moon. There are also two such clusters in the constellation of Ursa Major. One, in the bowl of the Big Dipper, has more than 300 members. It is at a distance of about 85 million light years and is receding from the earth at a velocity of about 9000 miles per second. The other Ursa Major cluster is one of the most distant known of all these clusters of extra-galactic nebulas. Its distance is around 235 million light years and it is receding from us at a velocity of about 26,000 miles per second. The increase in the velocity of recession of these clusters with distance has been found to be over 100 miles per second for each million light years increase in distance. There is another of these far distant clusters of extra-galactic nebulas in the constellation of Bootes, between Coma Berenices and Corona Borealis. They seem specially to favor those regions that lie farthest from the plane of our Galaxy, occurring in greatest numbers in the vicinity of its north pole. None at all are to be found within ten degrees of the Galaxy.

The appearance of the evening sky has now changed completely from that of six months ago. Orion and Gemini have disappeared below the western horizon. The Big Dipper in Ursa Major rides high above the North Pole in June, gradually shifting northwestward in the evening hours of July, while Cassiopeia, conspicuously in view above the pole on winter evenings, now lies below it, nearly resting on the northern horizon in mid-latitudes of the northern hemisphere in June.

A remarkable feature of the evening skies at this time of year is the scarcity of brilliant first magnitude stars, as compared to those of winter, and also the huge size of many constellations now in view. Hercules and Ophiuchus are enormous constellations. The brightest stars in Hercules are only of third and fourth magnitude. Alpha Herculis is a giant, red, variable star, never brighter than third magnitude. The brightest star in Ophiuchus is Alpha Ophiuchi, the only star as bright as second magnitude in that huge, rambling constellation. Virgo is one of the largest of all the constellations, but it has only one first magnitude star, Spica, a beautiful bluish-white star, and no other stars brighter than third magnitude. Coma Berenices contains no stars brighter than fourth magnitude, but a large number of fifth and sixth magnitude stars.

Vega, in Lyra, and Arcturus, in Bootes, a conspicuous kite-shaped constellation, are the two most beautiful and brilliant stars in summer evening skies. Vega, a diamond-like star in its glittering splendor, is only a tenth of a magnitude brighter than the orange-colored Arcturus. Both stars are brighter than zero magnitude. Regulus, in Leo, and Spica in Virgo, both bluish-white in color, are stars of the first magnitude that we associate with spring and early summer. On June and July evenings Spica is visible in the south or southwest, and Regulus is approaching the western horizon.

Zenith

By RAY ROMINE

There's Sirius for the winter night;
There's Fomalhaut for fall;
Arcturus gives us vernal light,
But far above them all
June owns the highest blue-white sun:
Vega, the enchanting one.

By far the finest constellation in summer evening skies is the magnificent southern constellation of Scorpio, known also as Scorpius. It was, according to ancient mythology, the bite of this scorpion that Orion, The Warrior, always feared so greatly that he fled below the western horizon when the scorpion appeared in the southeast. Scorpio is not seen to the best advantage in the mid-latitudes of the northern hemisphere, where its long curved tail, outlined by many bright stars, either approaches close to or disappears below the southern horizon. In northern latitudes it is best seen in the evening hours of July. It is due south around nine o'clock in the evening (Standard Time) about July 10. Antares, its most brilliant star, is a red giant of first magnitude, with a green companion star that is found with difficulty with small telescopes because of the glaring light of the principal star. Antares is at a distance of about 170 light years. Its diameter is estimated to be about 400 times that of our own sun. The splendor of Scorpio as a constellation is enhanced by the fact that it lies in a brilliant part of the Milky Way. In addition to Antares, of first magnitude, which lies in the heart of the Scorpion, the body and tail contain six stars of second magnitude and an equal number of third magnitude.

A small but beautiful group of stars in the summer evening sky is Corona Borealis, The Northern Crown. With the exception of Alphecca, the gem in the Crown, which is of the second magnitude and the brightest star in it, the principal stars that outline the nearly perfect semi-circle are of fourth magnitude or fainter. The second magnitude nova known as "The Blaze Star" appeared suddenly in this constellation in 1866. Now known by the name of T Coronae, it declined to ninth magnitude in two (Continued on page 332)

The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

SOME SUMMER SEMANTICS

IN ADDITION to an elaboration of the title, I propose developing a minor report on the choice of the readers of this page regarding past and future special inserts that have appeared for years in *Nature Magazine*. Let us get that report out of the way and then to our special subject.

A surprisingly large number of readers responded to my proposal, two months back, that you, as readers of this page, help me determine the subject matter for future special educational inserts. Of the twenty-six proposed topics all but one found supporters among you readers. The only topic you did not want elaborated was the one dealing with bird boxes. Under the circumstances you will not get such an insert, although it could be made most attractive. If any of you really want such an insert it is time that you make your wants known. The five proposed topics that won the greatest support were clouds and weather, orientation, scats and droppings, traps, and the bark of trees. Other high-ranking topics included lichens, fresh-water algae, more ecological units, the aquarium and more insects. Fortunately the next insert has been prepared to deal with this last topic among the high scoring units. Among the inserts already published the highest-ranking topics were tracks, twigs in winter, poisonous plants, water level, and flavors and scents.

I can well use this little survey of mine as an introduction to the rest of this school page. It was conducted with no thought whatever of imposing difficulties on anyone. The participants on both sides were known by name. I have written evidence to support this report to you. The study will be used to bring two parties together. I shall not try to force you to read an insert on special bird houses, even though I might differ with you as to the desirability of such a choice. As a matter of fact, it happens that I am glad that you voted as you did, but that is beside the issue.

Now for the rest of this article. Just a few minutes before I began to write it my telephone rang. I answered it and a pleasant male voice asked if I were Mr. Palmer. I informed him that I was. He did not tell me his name. He then asked me if we had a room in our home for student roomers. I informed him that I did, but that it was already contracted for a year in advance. He then informed me that he was conducting an anonymous survey to determine the views of those who used the university rooming lists to advertise their rooms, and particularly wanted the views of such parties in matters of discrimination. I confess that that sentence got my goat. In the first place I do not believe in anonymous surveys any more than I believe in anonymous letters to the press, anonymous telephone calls, or anonymous visits to homes at night by representatives of any government or of any race. I refuse to participate in such anonymous activities, hooded by anonymity of phone, press or hooded sheet, and I vigorously resent the cowardly nature of those who seek safety in such manner.

In this case, it happens that I have never listed our room with the university, and the caller's assumption that I had was wrong. Therefore any data I might have supplied would have been impertinent to his problem. It happens that, at present, the room is shared by members of a majority and a minority race. It happens that I was reared as a member of a minority religious group and know to a slight degree what ostracism may be. It happens that all through my life I have moved with groups who differ with me in matters of politics, economics, educational philosophy, prohibition, religion and race, and I have frankly enjoyed working out the problems that such conflicts have imposed on my behavior. I have defended minority groups before my peers at considerable sacrifice to myself, and have been betrayed by members of minority groups I have defended. I think that we all grow by living in some degree of conflict with our environment, but I do not see any solution of this problem through the media of anonymous telephone calls that may yield data impertinent to the problem.

Such surveys are necessarily dependent on the integrity of the surveyer, and I do not respect the integrity of any anonymous inquirer into problems that may result in censure. What do we mean by anonymous, by discrimination, by freedom, by democracy, by liberty, by agrarianism, by imperialism, by communism, by capitalism, by integrity, honesty and friendship? Don't you imagine that my interrogator would discriminate against those whom he described as discriminators! I do not know what my telephone inquirer would have done had I informed him that, since I did not use the university listings to advertise my room, I was not eligible to vote on his anonymous survey. I did not even tell him that I did not trust anonymous inquiries such as he was making. I did not tell him that in my judgment it was none of his business whom I took into my home as a roomer, and that I resented his assumption that he had any right to ask such a question of me, particularly since he knew nothing of my record in the field of his inquiry. Instead of continuing the conversation I merely told him to forget it and hung up. I wish I knew how I am classified in his anonymous survey. I have a hunch.

This whole field of semantics, and misunderstanding based on the use of words, enters our field of interests this summer particularly. The political conventions will be pregnant with weasel-worded platforms designed to bring supporters to one field or another. A mass of our population will be considered as labor, another as capitalists, and the rest of us as white-collared residue, when, as a matter of fact, there will be little homogeneity in any of these groups. There will be anonymous handbills, telephone calls, and hotel room caucuses. Men will speak glibly of representing thousands whom they do *not* represent. The fate of liberty and democracy, as we understand it, may depend on what happens this summer in our major political conventions. Surely we need to look with care on offerings that are made in the major cities and at the whistle-stops.

And what goes for politics goes as well for education. We will have this summer hosts of workshops that are not workshops at all, of summer schools that are merely summer vacations, of science programs that have little to do with science, of Nature schools that deal neither with Nature nor schools, and of camps that are glorified hotels. One way to get the straight slant on these things is to go see for yourself. May I suggest a few trips.

In Detroit, on July 1, 2 and 3, there will be meetings of the National Education Association. The program on conservation education will present the views of social scientists, of natural scientists and of educators. Maybe we can work out a basis of understanding. Maybe you can help.

In Ithaca, New York, on September 8 and 9 there will be a meeting of the American Institute of Biological Science and the National Association of Biology Teachers, during which the views on the teaching of science and conservation at elementary, secondary and colege levels will be discussed. We hope that we may see you there. Late in June the western section of the American Association for the Advancement of Science, and the American Nature Study Society, will meet in Portland, Oregon, and one of my chief regrets is that I cannot attend. Word to Dr. Ruth Hopson, P.O. Box 263, Bend, Oregon, will bring you details of the N.A.B.T. meeting. At about the same time, the National Science Teachers Association will meet at Ann Arbor, Michigan, and word directed to their headquarters in Washington should provide details. All of these meetings are designed to help us define what we have in mind. They are worthwhile.

My chief regret for this summer is that a ruling of a superior authority makes it impossible for me again to take part in the West Coast Nature School, one session of which I attended last summer. There I found a happy blending of technicians and educators; of young and old, of rich and poor. There was nothing anonymous about the experience. You mentioned a sequoia and leaned against it as you talked. You talked of fawns while one walked across you path. If you want to forget all this sort

of wordy discussion and folderol and sink your teeth into really understanding your environment drop a line today to Dr. Gertrude W. Cavins of San Jose State College, California, and make a reservation for the 47, 48 or 49th sessions of this established school, which is to meet at Yosemite June 15 to 21, at Fallen Lake Lodge in the Tahoe Lake region June 22 to 28 and at Asilomar on the Monterey Peninsula June 29 to July 5. You will never regret the experience and next year if it is possible I will be with them again. Then I will not be writing to anonymous readers and maybe we can get acquainted in a natural setting that I am sure we both will love.

Mineralogy Manual

Dana's Manual of Mineralogy. Revised by Cornelius S. Hurlburt, Jr. New York. 1952. John Wiley and Sons. 530 pages. Illustrated. $6.00.

This is the sixteenth edition of this classic manual that has served students, collectors and geologists for more than one hundred years in describing, classifying, and correlating mineral specimens. The last previous edition was in 1941.

Wild Flowers

An Introduction to Wild Flowers. By John Kieran. New York. 1952. Doubleday and Company. 77 pages. Illustrated by 100 pictures in full color by Tabea Hofmann. $2.50.

This is a book for beginners, introducing to them, in simple language, the more common wild flowers. It is a companion book to the author's *An Introduction to Birds.*

Michigan Birds

Enjoying Birds in Michigan. Edited by Homer D. Roberts and Clarence J. Messner. 1228 Chittock Ave., Jackson, Mich. 1952. The Michigan Audubon Society. 64 pages. Illustrated. $1.00.

This is a cooperative endeavor by members of the Michigan Audubon Society and is a guide to birding and the enjoyment of birds in that State. This is a most useful booklet.

Ancient Cities

Secret Cities of Old South America. By Harold T. Wilkins. New York. 1952. Library Publishers. 468 pages. $6.00.

For more than a decade the author has been collecting source material about the ancient past of South America, and in this book traces pathways back to these early civilizations.

India

My India. By Jim Corbett. New York. 1952. Oxford University Press. 163 pages. $3.00.

This is a series of stories grouped around the experience of Colonel Corbett himself and about the India that he knows so well, its people, and its animal life.

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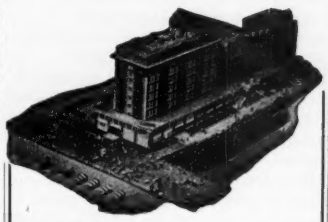

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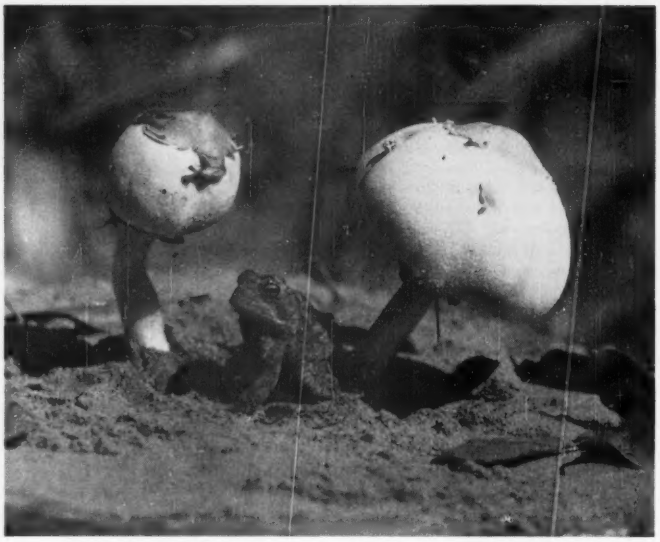

In making a picture like this be sure that the focus is on the eye and that the toad is in the sunlight. This is a Graflex shot.

TOADS are not particularly handsome creatures. Nonetheless, there is something about them that is rather appealing.

Not everyone will agree with me, I know. There are those who recoil in horror at the very thought of a toad — but people like that tend to cringe from many of Nature's creatures. Some people are so inconsistent that they go into a dither of delight over the beauties of a butterfly, and then turn and run from a fat, fuzzy, harmless caterpillar that will (given a few weeks) turn into a beautiful butterfly or moth.

In a way, I feel sorry for toads. They certainly do not deserve the bad reputation they have been given down the ages. Centuries ago the poor little warty amphibian was thought to be a symbol and a familiar of the devil. No wizard's potion or witch's brew was ever complete without a couple of dried toads. Shakespeare made one of his characters call them "ugly and venomous." Even today many people firmly believe that warts are the result of handling toads.

Poor little toad, hopping harmlessly about the garden, minding his own business and doing a good job of insect eradication, he cannot help it if he is warty and unattractive. But, so far as I am concerned, he is not unattractive at all. There is something pixie-like about him. Pose him with a couple of toadstools — which are, themselves, rather fairy-like things — and you have an interesting picture.

When I got the idea of taking some toad portraits a short time ago, I was inspired not so much by a toad as by a flock of toadstools that appeared overnight in the front lawn.

"What wonderful subjects for a photograph," I said to myself, "Now all I need is a toad or two to go with them."

Toads had been plentiful all during the spring. There were several that appeared regularly of an evening around the yard. But, as is often the case when you want something all of a sudden, there were no toads to be found when I decided to photograph them.

Obviously, an expedition was going to be necessary. So, enlisting the aid of the entire family, I set out. I will not guarantee that this toad-hunting technique will work in all locales, but it does work in Florida.

We waited until dusk, after one of the late-afternoon showers that fall so regularly in the summer. Then we drove to a little-traveled road that ran through a swampy, woodland area. Slowing the car to about ten miles an hour, we watched the road until a toad appeared in the glare of the headlights. Within a short time I had all the toads I wanted as models.

Next morning I prepared my stage. I wanted close-ups in the proper setting.

Accordingly, I found one of those earthenware saucer-like containers that are used under large flower pots. This I filled with damp soil. My stage was about twelve inches in diameter and an inch and one-half deep. I set it on an inverted flower pot to raise it off the ground.

Next, I moved some of the toadstools from the front lawn, being careful not to break the tops from the stems or to chip the brittle edges. I ran a wire up through the center of each stem, taking care not to push it out through the top. This served to strengthen the toadstool, while the inch of wire protruding from below helped anchor the plant when I placed it in the damp soil of my flower pot stage.

This is a forced, unnatural pose. What self-respecting toad ever perched on the top of a toadstool?

A 35mm shot. Only by considerable maneuvering can the subject and a complete toadstool be included in the picture. The entire 35mm negative was enlarged.

A carpet of dry leaves, gathered from under a nearby oak, was the next thing I added. Last of all came the toad.

Now toads, as models, are rather unpredictable. Some of them will sit and pose obligingly. Others will make one wild leap and jump completely out of the picture. Often they manage to scatter the carefully arranged leaf-carpet, or knock over a couple of toadstools in the process.

Fortunately, there is one simple way of calming down such obstreperous models. That is the ice box treatment. Being cold-blooded animals, toads can move rapidly only when they and their surroundings are warm. Put them in a jar and give them a cooling off period in the ice box. Do not leave them too long; five or ten minutes will do the trick. Do not, of course, put them in the freezing chamber.

Does the idea of a toad in the ice box horrify you? After all, the jar is clean and the toad never comes in contact with any of the box's contents. The process does not seem strange to me, but I will never forget the reaction of a camera group I was speaking to last winter. I was telling them of my cooling-off system for making models manageable. "I'd hate to eat anything out of your ice box," one of my audience muttered to himself, not too softly. Really, he rather hurt my feelings.

In taking the accompanying pictures, I used direct sunlight and no other method of lighting. I like the natural-looking shadows that result. But, by all means, be sure the toad is in the sunlight. In the shadow he becomes nothing but a dark blob. It is sunlight that brings out all the interesting, pebbly texture of his hide.

I was experimenting with cameras as well as with toads when I took the pictures that illustrate this section. I was testing the merits of extreme close-up photography.

I used the 35mm Kine-Exakta with extension tube arrangement that allowed me to bring the lens within a few inches of the model. I also used the 4 x 5 Graflex with the double extension bellows. With this I could get nearly as close as with the small camera. However, I stayed farther back and tried to include more details in the larger field of vision.

What were the results? Well, judge for yourself.

The closest focusing range for the Exakta without extension tube is about three feet. The shortest tube attachment brings the camera to within about twelve inches of the subject. Thus, there is a two-foot range that cannot be covered.

The 35mm close-ups are clear and the details are good. The main trouble was that I had to get almost too close. The toad filled so much of the ground-glass viewer that little else was visible. Nearly all of my carefully collected toadstools were completely out of the field of vision. Only by careful maneuvering was I able to include all of a single small toadstool in the picture. In most cases only a portion of the plant could be shown.

As for enlarging and printing the resulting negative, by pushing the enlarger up as high as it would go, and by using the entire negative, I got a picture $3\frac{1}{2}$ x 5 inches in size. Of course, by swinging the enlarger around and putting my printing easel on the floor, I could have obtained a larger picture, but I was not in the mood for such gymnastics.

The Graflex shots, on the other hand, comfortably accommodated two or more toadstools, plus toad, and a fair amount of surrounding territory. The 4 x 5 negatives could easily be enlarged to 8 x 10 dimensions, nor was it necessary to print nearly all the negative to gain those proportions.

What, if anything, the experiment

The new Kodak photo light bar can be used on either movie or still cameras to give more light on the subject.

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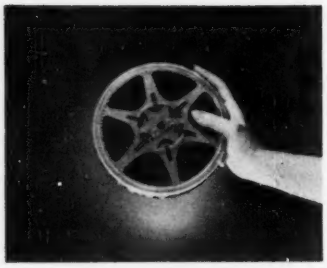
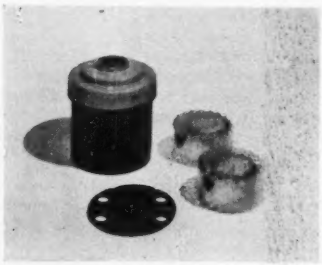


Film reel cans are now made of transparent plastic.

proved I am not sure. Large cameras have certain advantages and certain drawbacks. The same can be said of miniature cameras. I do not know how many people want 8 x 10 enlargements. Certainly, the storage of them gets to be something of a problem in a short time.

But, to get back to toad portraiture. I tried a number of different poses —



This Kodacraft miniature roll film tank can be used (with plastic aprons) to develop two rolls of film at once.

using one toad or two, and a variety of toadstools. The conclusions I have drawn from the results follow:

1. The use of two toad models at least doubles the posing difficulties. Occasionally they are both quiet, well-behaved models. Usually one of them moves before the picture is taken. Sometimes they both jump — in opposite directions, as a rule — and the resulting damage to the stage set is considerable.

2. It is best to take the picture from toad-level. The model, being dark, should be silhouetted as much as possible against a lighter background. When the picture is taken from above, protective coloration allows the toad to blend too much into the background.

3. Remember, the toad should be in the sunlight. Important details are lost in shadow.

4. Try for natural poses. The picture of the toad sitting on the toadstool is an artificial one. It took me some time to persuade the model to "stay-put." My non-scientific friends have been amused by the resulting picture, but I do not like it. No self-respecting toad ever sat on a toadstool, so why pose one there?

5. Be sure to focus on the eye (toads have very nice eyes, have you ever noticed?)

6. For shutter speed and lens aperture, depend on your exposure meter, if you have one. If not, remember the slower you take the picture, the more detail you can capture by decreasing your lens aperture. A cooled-off toad should pose for a 1/50 second exposure, if not slower.

When the photo session is ended, be sure to let your models go. Often they can take care of themselves in the yard or the garden. But, if you live in a place not suited for toads, be sure to take them back where you collected them and set them free.

NEW PRODUCTS

Now for a few notes on new photographic materials. Eastman displayed a number of these at the annual Master Photo Dealer and Finishers Association convention in St. Louis. Some of the equipment was designed for large-scale commercial use. Others would be usable by the amateur home photographer.

For the minature camera owner who develops his own film, Eastman has a Kodacraft miniature roll film tank that can be used to develop two rolls of film at once. The exposed, undeveloped film is first wound around plastic aprons and the aprons are placed in the tank. Solutions may be poured in or out of the tank without removing the cover, so developing operations can be carried on safely in full room illumination once the film has been inserted. The tank costs $2.53, the aprons 55 cents each.

For home movie makers and for still photographers, too, there is a Kodak photo-light bar that can be attached to any camera having a standard tripod socket. The frame is suitable for use with either 375-watt medium beam reflector flood or with 500-watt reflector flood or spot lamps. The lamp beams can be directed to the desired object, and each lamp switches on and off independently. The frame folds inward for convenient storage. Cost of the outfit is $8.75.

Specifically for movie makers is the Kodascope transparent plastic reel can. Titles pasted on the reel can be read through the plastic and, more important, the movie maker can see at a glance just how much space is left unfilled on any reel. Price of the can and one 400-foot reel is $1.60, or the items are available separately for 90 cents.

A TORNADO'S TOLL

(Continued from page 298)

carried on. The doves built 24 nests but raised only 15 young, since the town seemed to be in a storm belt and was subjected to another heavy storm, with three inches of rain, two weeks after the tornado, and there were several other heavy squalls. Young also were reared from three robin nests, and from an undetermined number of nests of English sparrows, woodpeckers, wrens, orioles, and chimney swifts. A barn swallow was seen with five young. At the peak of this population increase, just before migration, there were still only four percent as many birds in the Portsmouth area as in similar undisturbed areas nearby. Then came migration. Birds from the north flowed through Portsmouth and local birds joined them to wing southward. It would not be until another year that Portsmouth would again enjoy the swell of morning song and the beauty of abundant birds.

Postscript: Although this storm was in 1940 its story is reenacted in some part of the country every year. Night tornados are more lethal to wildlife than those that strike in the day. Follow up of another one equally as severe, which occurred near Ord, Nebraska, and which struck during the day, revealed a very small loss to bird life as compared to the loss from the Portsmouth storm.

THE TALE OF A TURTLE, OR THE LIFE OF RILEY

(Continued from page 300)

within a period of a few days, and I suppose is analagous to the shedding of the skin in entirety by the turtles' near-relatives, the snakes.

When Riley first came from the cold clear waters of the North Fork his shell was covered with green tresses of an epizootic filamentous alga of the class Chlorophyceae. In the flow of the stream the algal filaments form a delicately swaying microfloral camouflage of the turtle shell. The algal holdfasts appeared to be imbedded beneath the chitinous scales, growing under these where the hexagonal plates of the carapace join. Evidently change to the warmer and still aquarium water is lethal to this alga, for in a matter of weeks it had disappeared from Riley's shell and never again became evident. It is believed that certain of these algae are found nowhere else except upon turtle shells, so specialized has become their environmental needs.

Sale of a house brought an end to the suburban life of Riley, and just as he had started his association with man with a canoe ride on one of Missouri's finest rivers, he again travelled by canoe down the Jack's Fork, where he was freed in this similar river in the watershed just north of his birthplace. Let us hope that Riley forgets his days of urban association with man and reverts to the wild, refraining from begging for horse meat at the side of some fisherman's boat. On this famous small-mouth bass river fisherman, rightly or wrongly, are very unsympathetic toward geographic terrapins.

That Tick Problem

People who go into the woods and fields, and even those whose outdoor adventuring is no more rugged than a round of golf, can acquire unwelcome travelers in the form of ticks and chiggers. There is always the possibility that these insects may be disease carriers. Various insect repellents have been devised to apply to exposed parts of the body, but Whitmire Research Laboratories, St. Louis 10, Missouri, has been working with Government agencies whose personnel work in the outdoors to devise broader protection. They have now come up with an "impregnation bomb" that is called "Ticks-Off," and which gives off a mist that will impregnate clothing for several hours and ward off ticks and chiggers. It functions in a manner similar to a companion bomb called "Fleas-Off," which impregnates a dog and discourages fellow travelers on the canine pet. The tick discourager is now widely used by woodsmen, foresters, park rangers, and is finding wide favor among outdoor people generally.

Conservation Caravan

August 23 to 30 are announced as the days for the fourth Conservation Caravan sponsored by the Conservation Forum of New York State and the Buffalo Museum of Science. The Caravan will travel from Buffalo to the Finger Lakes, to Hawk Mountain Sanctuary in Pennsylvania, to the Hudson, the Catskills and Adirondacks and back to Buffalo. Travel will be by chartered bus and the total cost of the eight-day trip is eighty dollars. It will be under the direction of Miss Mabel H. James, chairman of the Forum, who may be addressed, for further details, at the Buffalo Museum of Science, Buffalo, New York.

Dragonfly Collectors

"Last summer," writes Margaret Gross Grisebe of Rochester, Michigan, "we happened on a novel way to make a dragonfly collection. We picked them up beneath the martin house!

"In the past we had often watched the martins bring in the 'darning needles' to feed their young, but we had never looked to see if any were dropped. Or perhaps the martins were more careless this year. The pole is set in the vegetable garden, with a vine growing at the base. Some insects fell on bare ground, others in vegetation.

"The children found the treasure and thereafter visited the place often. A good specimen was rare, for many had part of the body missing, but there was a good variety. There was nothing unusual, for we found all in our reference books. But for small children just beginning to build up a lore of insects they could recognize, it was good enough, with the added suspense of never knowing what would come next.

"The children's interest in insects was awakened when we installed our first two bee hives, and shortly afterwards acquired a book on insects with colored illustrations. Whereupon the two youngest, one just six and the other four and one-half, began to feel every insect *must* be identified and the call became common, 'Come quick. I don't know what this is.' For them the family name is enough.

"Now if we could just find another source that would bring us other material without any work on our part, our Nature study will continue apace!"

DECORATED PIGEON

By LUCY A. K. ADEE

OUTSIDE my upstairs windows there is a large, flat, tin roof. It covers a room on the floor below. Every morning and every afternoon, for several years, I have fed the wild birds that fly to this quiet sanctuary in the heart of the city. Sunflower seed for the cardinals, raisins for the mockingbird (this was his fourth winter, I know him by a special call which I taught him when he was brought by his mother); peanuts for the bluejays; bread and cracked grain for the gathering of sparrows, starlings and pigeons. There are about fifty pigeons.

One morning, when I went to open the window, I saw what was at first glance a newcomer among the regular pigeons. It was wearing a large white circle, like a Hawaiian lei, around its neck and hanging to the ground in front. Through this was the head of the pigeon.

It was so unusual that I looked more carefully as the pigeon sat on the roof parapet or walked around. To my utter amazement I saw the "lei" was a slice of white bread, a perfectly centered, evenly cut hole in the middle.

The decorated pigeon ate the grain I threw out, and later it flew away. There was no way of catching it to remove the necklace of bread. I knew the bread would either crumble during the day, or melt should there be rain. It was a cold, cloudy day.

The only plausible explanation seems to be that the large, perfect hole in the slice of bread had been made by a sandwich cutter — the crust was untouched — then the pigeon could, by pecking at it, possibly have gotten the lei over its head.

These pigeons are a city flock, flying at will. Although they come to my windowsill, even inside, if any grains or crumbs are left there, and stay on the roof for hours sunning themselves in summer, they are not tame enough to touch, or to take food from my hand, as are pigeons in the parks.

Study of Water

Water. By Sir Cyril S. Fox. New York. 1952. The Philosophical Library. 148 pages. Illustrated. $8.75.

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THE TUMBLING THRONG

(Continued from page 303)

the temperature rises 30 degrees in less than an hour, the snow begins to melt, and the gale becomes a blow. In late winter or early spring it takes a shingle-ripper of a blow like this to put the thistles through their best performance. At this time they have lost many of their leaves, branches, and seeds and present a minimum of surface to the wind. Generally being waterlogged as well, they will have no part with zephyrs now.

In our plains country, the windmills turn their faces from the blast at 20 to 25 miles per hour. At 40 to 50, dust clouds stream off the fields, like smoke from vast stationary fires. At 60 to 70, telephone wires cease to hum and begin to scream in cadence. Boards jump along the ground. The wind plucks alarmingly at our buttoned coats, while the taste of saltflats is in our mouths. The cattle drift steadily to leeward, or stand mournfully bawling in the corral. Then the tumbleweeds come into their own.

Fence corners, hay stack full, rise *en masse* when the wind gets under the tangled pile. The spiny clusters leap into the air. They fall, twisting and wrestling on the ground. They break holds, and suddenly the jostling throng gathers speed, separating as it goes until the swift-moving balls race wildly over the prairie and toward the horizon. No obstacle impedes their progress. They creep around buildings, edge through stream-side shrubs and trees, pile up layers against fences over which their fellows climb, and then in concerted exuberance, push down the fences, and all are free again.

But the wind dies and this widespread wandering comes to an end. The seeds are scattered, and now the gentle days are back again. In every niche, favorable or unfavorable, the Russian thistle seeds are there, ready to begin the sedentary stages of their varied existence.

VANDALISM—NATURE'S NO. 1 ENEMY

(Continued from page 317)

the danger or the depredations, but certainly pointing the way to the end. A poll of park supervisors showed an almost unanimous opinion that the years since 1948 have shown a definitely quickened conscience on the visitors' part.

There has always been the quiet little man who, when everyone else had departed, would prowl through the picnic areas, picking up papers and trash, straightening the trampled bushes, and clucking over the items beyond repair. Every park attendant has seen him and loves him. Perhaps it was the spirit of this unobtrusive, gentle person that has become contagious, or perhaps the instructive words of the rangers and the naturalists are finally taking effect. Perhaps parents have told children, and the children have grown up. Whatever it is, there is a new spirit abroad, a new wind blowing, and appreciation is the keynote of its song.

For some time, there have been groups of volunteers in several eastern parks, helping the attendants there on rush days, cleaning the grounds and posting signs, tactfully guarding against deliberate ruination of the park emplacements, and patrolling the trails to help where possible. In Tucson, Arizona, a few months ago, headlines were given to the group of citizens and the hauling company that combined their resources to rid the desert roads in their district of papers and refuse that had been accumulating there for years. Several Michigan organizations have conducted State-wide drives to remind the indifferent visitor to its great outdoor areas of his stake in their well being. Luckily, this spirit is contagious. A thrown bottle retrieved means several bottles not thrown, a tree spared once is a tree perhaps forever growing. The result of this benevolent infection is each year becoming more apparent in its final excellent form. The trail is now well blazed.

Outdoor America offers the largest returns possible in spiritual and physical recreation for the small amount of effort expended, as millions of people have learned. If only a fraction of these millions would dedicate a small part of their time to passing on this lesson, to teaching groups of neighborhood children some of the intimate wonders of their nearby fields, it would be a valued contribution. They could show by example what a small enterprise in helping local parks and the region's countryside will reap in terms of personal satisfaction and good accomplished. Above all, they would teach all to guard against careless, lazy acts of destruction on their own part. Then the tide of vandalism would continue its present ebb and America would be the better by far.

This land is ours, indeed, but it is also our neighbors' and our children's. Let us leave them no less than we have found.

THE EVENING SKY IN JUNE AND JULY

(Continued from page 325)

months, but suddenly flared up to third magnitude in 1946. Its light fluctuations are quite unpredictable.

Summer begins this year in the northern hemisphere on June 21, at 6:00 A.M., Eastern Standard Time, when the sun is farthest north. It is then entering the Sign of Cancer and is in the constellation of Gemini.

Mercury is in superior conjunction with the sun on June 8, and will be too near the sun for observation until around the time of greatest eastern elongation on July 15, when it may be seen low in the west just after sunset. Venus will be in superior conjunction with the sun on June 24, and too near the sun for observation during these two months. Mars is in Virgo, east of Spica, in June, near the meridian at sunset and visible until around midnight. On June 10 it changes its motion from retrograde, or westward, to direct, or eastward. In July it passes from Virgo into Libra and may be seen in the southwest all the evening. It is now decreasing noticeably in brightness. Jupiter may now be seen in the eastern sky for some time before sunrise in Aries. In July it rises about midnight. Saturn is in Virgo, west of Spica, during these two months. Near the meridian in the southern sky early in June, it is 90 degrees east of the sun on June 30 and will be found in the southwestern sky in July.

Data on Baird

Word comes from Dr. E. C. Herber of Dickinson College, Carlisle, Pennsylvania, that he is preparing a new biography of Spencer Fullerton Baird, 1823 to 1887. He will welcome correspondence with anyone able to furnish original material about this great naturalist.

The above picture of a female ruby-throated hummingbird is sent to us by James R. Ellwood of Valencia, Pennsylvania. The body was not discovered until late October, so time and weather had eliminated evidence that might have indicated what took place. The bird hangs in a V between two gladiolus leaves, but the leaves were not knotted or twisted together in any way. It is an example of an accident in Nature.

Butterfly Club

James M. Unseld, Jr., whose interesting address is Gravel Switch, Kentucky, writes us to ask that we give some publicity to The Butterfly and Moth Club, open to young amateurs interested in Lepidoptera. There are some 100 members, he says, who exchange specimens. A little mimeographed publication is issued. Dues are $1.50 a year. Okeh, Jim?

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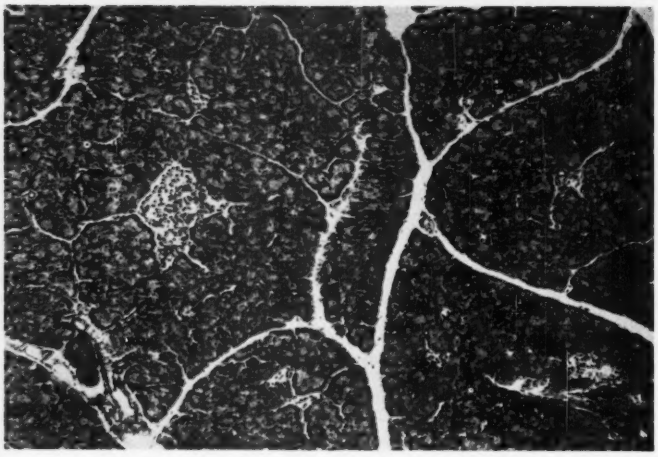
UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

Photomicrographs from slides loaned by Germain Crossmon



A section of pancreas, routine staining, showing alveoli (dark) and island (light).

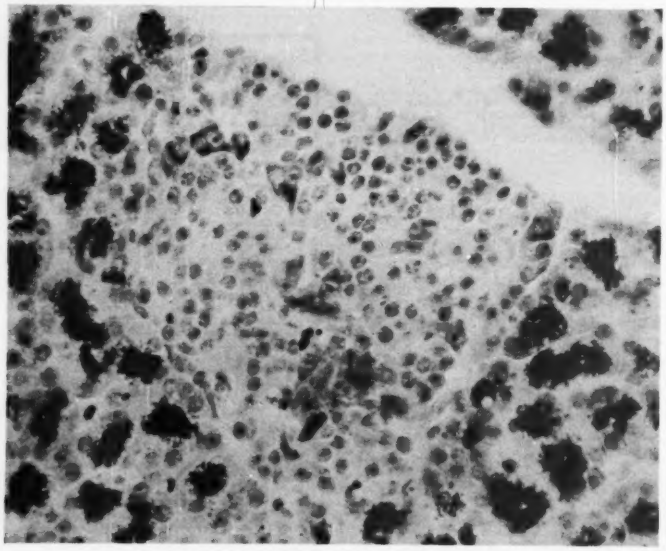
THE PANCREAS

Among the more conspicuous organs of the abdominal viscera in vertebrates, the pancreas is the least well known to the average person. Everyone is aware that he possesses a heart, stomach, liver, and two kidneys — but a pancreas? Some questions likely to arise are, where is it? Is there more than one? What does it do? And what happens if or when it becomes diseased?

One factor making for the obscurity of this vastly important organ is the abence of a common English name in general use, comparable to such terms as lung or brain. *Pancreas* is a Greek word meaning "all-flesh." The butcher's designation for this delectable item, as found in calf or sheep, is *sweetbread*. Since the thymus gland also receives this same monicker, it is often distinguished as the throat or neck sweetbread, whereas the pancreas is the stomach or abdominal sweetbread. But this is a culinary rather than an anatomical word.

The pancreas is the second largest gland in the body, being exceeded in size only by the liver. In man it lies transversely in the abdominal cavity, behind the stomach. It is elongate but larger at one end than the other; the wider end constituting the "head," situated to the right, bent downward against the duodenum, the more tapering end being the "tail," extending as far as the spleen. It is a compound racemose gland, the word "racemose" indicating a structure like a bunch of grapes; another description is compound tubuloalveolar gland, each alveolus (acinus) or end-piece of secreting cells terminating a branch of the duct system. The secretion of these alveoli is purely serous, and hence the pancreas is very like the parotid gland (described last month) in general features. This likeness is reflected by the German word for pancreas, *Bauchspeicheldrüse* (belly-salivary-gland).

However, it is not a simple gland arising from the repeated subdivision of a single duct. Study of its development reveals that it starts as two or three separate outpocketings from the embryonic intestine. There is a *dorsal pancreas* that grows outward as a diverticulum or evagination (both terms indicate an outpouching or outpocketing) from the dorsal side of the gut, nearly opposite the similar diverticulum to form the liver, which arises ventrally. Either from the wall of the liver evagination there also grows out a second pouch, the *ventral pancreas*, and there may be two of these, to make a total of three potential pancreases. The relative degree of development of these components varies in different vertebrates. In man the ventral pancreas is small, contributing only part of the head, while the rest of the head and all of the body and tail result from growth of the dorsal pancreas. The two do not fuse, but the divisions of each, or *lobules*, lie side by side in such a manner as to give the appearance of a single organ. Nor does this partnership have a definite capsule, but instead the lobules are retained by ducts, vessels, nerves, and areolar connective tissue.



A pancreatic island, 500X. Alpha cells are the larger ones with large, oval, clear nuclei. Others are beta cells.

The main pancreatic duct was first described by Wirsung in 1642, the accessory pancreatic duct by Santorini in 1775, both ducts today bearing the names of their discoverers. Their development constitutes one of the best-known examples of evolutionary organ piracy. *Wirsung's duct* is the outlet for the ventral pancreas, but captures or takes over the dorsal pancreas, becoming the main duct, whereas *Santorini's duct*, the stem of the dorsal pancreas and presumptively the major tube, is tapped by Wirsung's, robbed of its rightful territory, and remains in the adult, if at all, as a minor channel, draining only a portion of the head of the pancreas. In the pig, Santorini's is the main duct, and there is much variation in different animals as to the relative size and persistence of these two ducts, as also in their relation to the bile duct. In the shark, which has only the

Alveolar cells, pancreas, 1200X, stained to show mitochondria and zymogen granules.

dorsal pancreas, with Santorini's duct, the opening of this tube into the duodenum lies opposite the entrance of the bile duct, as per their respective origins in the embryo as dorsal and ventral diverticula; in mammals, if the duct of Wirsung is the principal one, the bile and pancreatic ducts join just before entering the intestine, the common chamber being the *ampulla of Vater*, opening by a single *papilla* or nipple-like projection into the duodenum. An elaborate valve of visceral muscle surrounds this opening, the *sphincter of Oddi*. This arrangement of united ducts is also a persistence of embryonic relationships.

If Wirsung's duct is followed, as it extends throughout the gland, it is observed to divide repeatedly, each ultimate branch terminating in an alveolus, elongate in shape. All of the alveoli considered together comprise the *exocrine pancreas*, producing the digestive fluid, pancreatic juice. In sections, the alveoli look circular in cross section, tubular in longitudinal section, while in reconstructions they are pear-shaped. The terminal cells are not necessarily, however, evenly grouped around the end of the duct, but may bulge to one side, the narrow duct with a wall of small cubical cells appearing as if telescoped within the large cells of the wider alveolus. As described by Nonidez and Windle, the alveolar cells may fold around the duct cells and bulge to one side like a boxing glove pulled on over the hand and wrist. In sections through certain planes, this arrangement gives the appearance of small centrally placed cells within the alveoli, and these were called *centro-alveolar cells* and remained an enigma until it was shown that they were actually duct cells. There are no secretory ducts, as in the parotid. The main or excretory ducts are made of a simple columnar epithelium containing goblet cells, accompanied by a thick connective tissue as far as the center of a lobule; then intercalated ducts continue to the alveoli, lined with cuboidal or flattened epithelial cells, much smaller in size than those of the end-pieces.

The secreting cells are pyramidal wedge-shaped in section, and exhibit a basal blue and an apical red zone when stained with hematoxylin and eosin. The pancreatic secretion originates as *zymogen granules*, demonstrable by certain techniques, and includes three well known enzymes: trypsin (proteinase), amylopsin (amylase, diastase), and steapsin (lipase) for the splitting of proteins, carbohydrates, and fats, respectively. It is not known, though, whether there are separate kinds of cells or of alveoli to manufacture each enzyme, as would seem likely.

The discovery of the *endocrine pancreas* came after the major features outlined above were known. In 1869 Ernst Robert Langerhans wrote a treatise on the histology of this organ, pointing out the pancreatic islands or islets that today bear his name. They are groups of cells, few to many, forming isolated areas in sections of the pancreas, that stain poorly by routine methods, and so stand out as light spots amid the dark alveoli. They are least numerous in the head, most abundant in the tail, and may number as many as a million or a million and a half in the human pancreas and even more in some other species. They make irregular cords or masses of cells, abundantly supplied with large capillaries, into which their secretion is poured, as they constitute a ductless gland.

Two German investigators, Johann von Mering and Oscar Minkowski, were working on the physiology of the pancreas in 1886. Since lipase was the only known fat-splitting enzyme, they thought some important information might be gained by finding out what happened to fats in depancreatized animals. The important knowledge was certainly forthcoming, and as a completely unforseen outcome! Following the surgery, which was as carefully performed as if on human subjects, the animals recovered promptly, showing little effects for a while, then, within a ten- to thirty-day postoperative period, suddenly and invariably died. This was an entirely unexpected result and showed that the pancreas was necessary for life, although no one then knew why. Now happened one of those accidents of science that sometimes determines the success or failure of a project or permits a new discovery. In this case, an unannounced addition to the research team took the form of one or more janitors or caretakers whose names are now lost. They reported large congregations of ants in the cages of those animals whose pancreas had been removed, whereas none were observed in other cages. This called for investigation and it was quickly found that the urine of the depancreatized animals was loaded with sugar. Von Mering and Minkowski noted similarities in this condition to symptoms of the dreaded human disease, *diabetes mellitus*, or sugar diabetes, at that time highly prevalent

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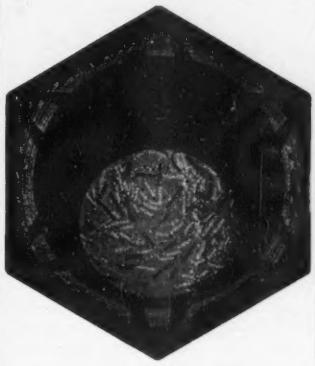

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and fatal. Could it be possible that diabetes, supposed to be a kidney disease, was in fact caused by some pathologic condition of the pancreas?

The whole matter was restudied intensively. Here would be a prize indeed, of far greater practical and immediate importance than academic curiosity about an enzyme. In autopsies of persons dying from diabetes, structural damage to the island tissue of the pancreas was sometimes found. The pancreatic duct was tied off experimentally, so that no pancreatic juice could escape or enter the intestine; although the alveoli degenerated after a while, no diabetes resulted nor did the subject die. So loss of the complete pancreas brings on diabetes, but of the exocrine portion does not; hence it could be that the islands of Langerhans might exercise some sort of relationship to this disease. If whole pancreas is fed to a sufferer from diabetes, there is no effect. If it is pulped up and an extract made, this is likewise ineffective, and investigators were forced to conclude that an island product, if any, was digested by one or more alveolar enzymes when the two were mixed. There seemed no possibility of separating these microscopic elements or their products. Countless attempts over a twenty year period to extract the supposed pancreatic hormone with many varieties of solvents all failed.

No further progress was made in this research until 1922. In those years Dr. J. J. McLeod was teaching embryology at the University of Toronto, and in his class one semester there sat and took notes a certain medical student who answered the roll call when the name Frederick G. Banting was read. In due course he graduated and set up practice, but was not content to drop his academic studies. Diabetes interested him, and he one day recalled a remark McLeod had made in a lecture on development of the visceral organs; that the island tissue of the pancreas was fully formed before the alveoli. This gave young Banting an idea. He believed in the then unproved assumption that the pancreas was really two glands, and thought it possible that the digestive enzymes altered the island hormone. Would it not be possible to secure an embryonic pancreas, and obtain the islands or their product before the alveoli had manufactured the destructive enzymes? Correspondence and conference with his old teacher led eventually to the formation of a research team to attack this problem: Banting, Charles Best, McLeod, and J. B. Collip. The work was severe and protracted. Many obstacles had to be overcome. But the thinking was right, and at length, in 1922, their efforts were successful, and an extract of embryonic pancreas, free from enzymes, was obtained. When administered to depancreatized animals it proved helpful, and ultimately, after sufficient concentration and purification, to human diabetics as well. In 1927 the essential material was obtained in pure crystalline form and named *insulin*, as being a product of island (L., *insula*) tissue. Dr. Banting received the Nobel Prize, and millions of sufferers have since lived out more or less normal lives because of his great discovery and work. In World War II, medical science lost one of its famous men when a plane carrying General Sir Frederick Banting and party was lost in a crossing from Canada to England.

The healthy pancreas produces an amount of insulin such as to maintain the proper level of sugar in the blood; 0.1% glucose, the simplest sugar, is normal, but in diabetes the amount may be from ten to twenty times as great, or even up to nearly 8%, a condition termed *hyperglycemia* (above-sweet; i.e. over supply of glucose). The designation *hypoinsulinism* (below-insulin) is now also much used; the first word appraises the effect, the second the cause. The clinical picture is one of the strangest, and is by no means as yet fully understood. In the absence of sufficient insulin from the islands of Langerhans, the body begins to throw away sugar, the basic food source of energy. That which is in the blood is no longer utilized by the muscles as a heat and energy producer, but accumulates until the kidneys begin its expulsion; the urine shows a heavy load of sugar (*glucosuria*); the liver, that great storehouse of carbohydrates, begins to pay out glucose into the blood, as if in a vain effort to provide this essential substance; glycogen in the muscles and eventually the fats and at last the proteins of the body are tapped, their variously elaborate molecules being digested so as to reduce to the simpler glucose. But all is a useless effort. The body is like a household in which one member has gone crazy, throwing all the groceries out the window as fast as others bring them in.

Neutral fats accumulate in the blood (*lipemia*); reserve fats are rapidly and incompletely oxidized, resulting in the formation of certain substances termed *ketone bodies* in the blood (*ketosis*) and urine (*ketonuria*). One of these ketones is *acetone* which, as a symptom, may be detected in the breath as well as in the urine.

As a result of these bodily changes, the sufferer from diabetes has a severe impairment in both carbohydrate and fat metabolism in the body, acid accumulations, great thirst and excessive urination, progressive loss of weight and strength, impairment of perception, and at last coma and death. The patient starves to death in the midst of food, and we might appropriately paraphrase Coleridge's famous couplet, in the *Ancient Mariner*, about the becalmed sailors surrounded by undrinkable water: Rations, rations everywhere, nor any bite to eat. Injection of insulin promptly alleviates all of these symptoms. Unfortunately this protein substance cannot be taken by mouth, as it is destroyed by the protein-splitting enzyme, trypsin, from the same organ that made the insulin, the pancreas. Also unfortunately, the effect of injection is transient and must be repeated at frequent intervals. Insulin is thus not a cure at all; it is merely the replacement in the body of an essential substance which the body should provide, but for obscure reasons can no longer manufacture.

The injection must be carefully regulated as to time and amount for each individual, and related to the daily carbohydrate intake. Too much of a good thing can be as harmful as too little, and overdoses lead to over-excitation of nerves and muscles, involuntary twitchings of muscles, hunger, convulsions, shock, and even death. This condition is *hyperinsulinism*, with a fall in blood sugar (*hypoglycemia*) to as low a level as 0.04%. Should a diabetic feel shaky after an injection of insulin, he eats or drinks sweets, and may urgently require an injection of glucose, to ward off an *insulin shock*. This severe and dangerous state has been purposely induced, often with marked success, as a shock treatment to cure schizophrenia, the split-personality form of insanity.

The work done thus far leaves unsolved the riddle of the cause of diabetes mellitus in man. There is some evidence that the anterior lobe of the pituitary gland and also the cortex of the adrenal gland play a part; there is evidence of an hereditary factor; but the initial cause and some of the intermediate items are unknown.

In 1907, M. A. Lane described special methods by means of which he demonstrated that the cells in the islands of Langerhans are not all alike. The *A* or *alpha* cell is the largest of those present, and has a large oval nucleus appearing as relatively empty. The *B* or *beta* cell is much more numerous and is smaller and its nucleus is round and dark colored when stained. Bensley used neutral gentian and acid fuchsin to dye the granules of the *A* cells red and of the *B* cells violet. In the guinea pig he distinguished a *C* cell that was clear and without granules. Bloom found a *D* cell in man, which was subsequently recognized in other animals, and which may be the *C* cell in another phase, and this in turn may be the *A* cell in its young stage. In other words, the relations of these cells one to another is not yet understood. Four kinds are never found in any one preparation. It is presumed on chemical evidence that the *B* cells manufacture insulin, the function of the *A* cells being unknown.

Those who may wish to pursue advanced studies on the pancreas should consult Bensley and Bensley, *Handbook of Histological and Cytological Technique*, where are given methods of fixing tissue and staining sections to show zymogen granules in the alveolar cells and differentiation of the several cells of the islands.

A SUGGESTION

R. Dorothea Jones of Elizabeth, New Jersey, suggests an article on the various types of microscopes and the uses for which each is best suited. This appeals to us as an excellent and practical idea, and said article will be forthcoming.

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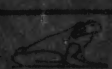

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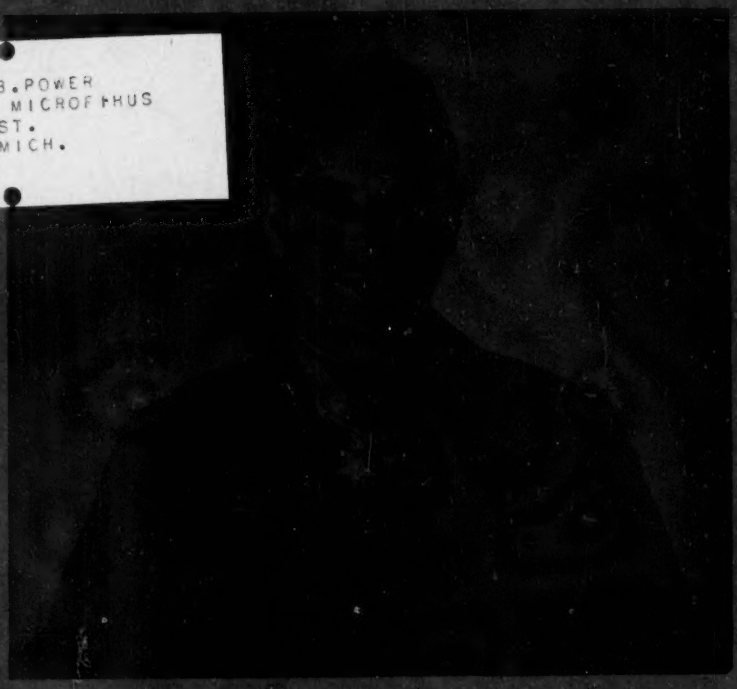

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